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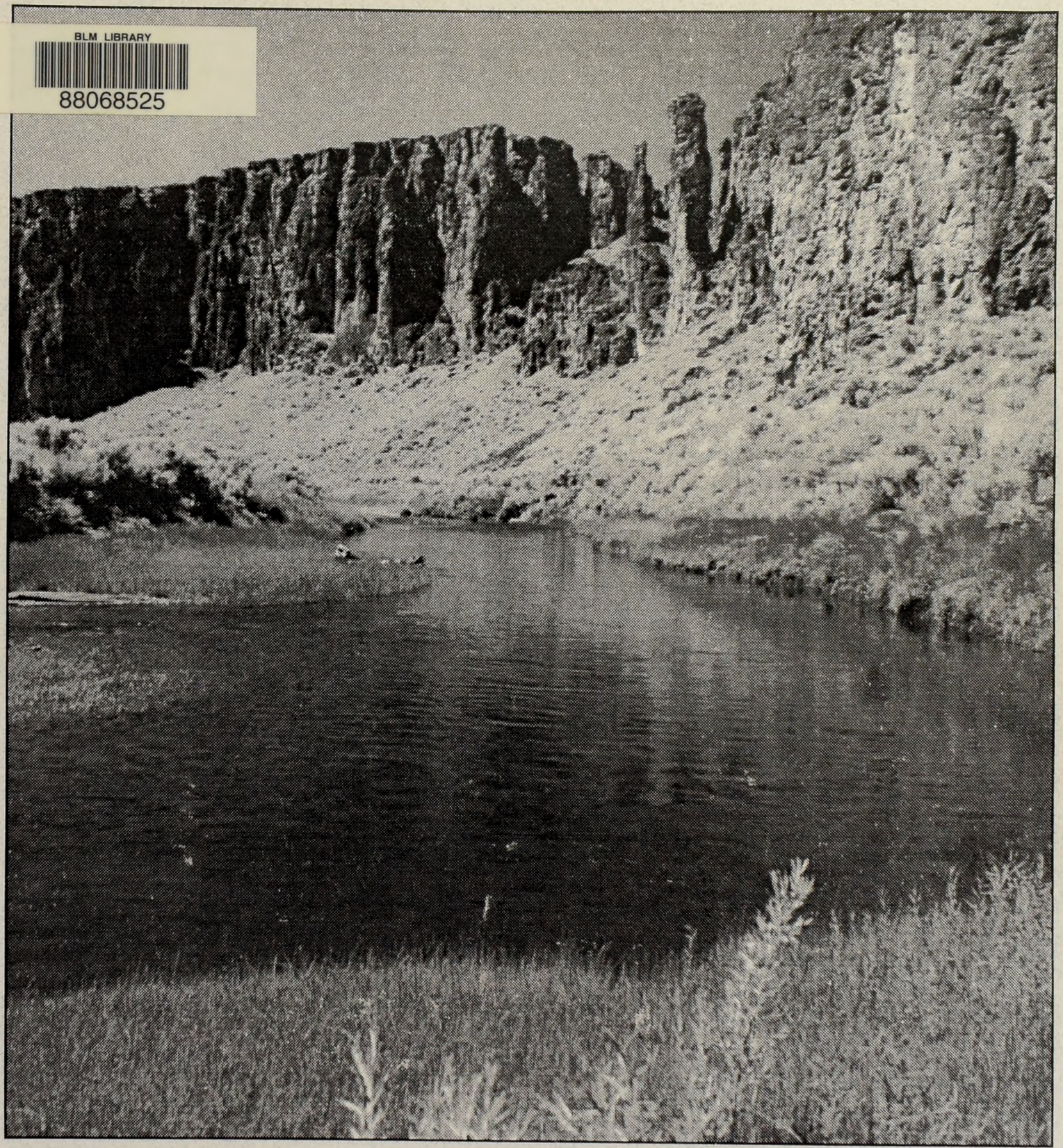

IDAHO CONSERVATION DATA CENTER

RIPARIAN AND WETLAND PLANT ASSOCIATIONS OF SOUTHWESTERN IDAHO

with a Focus on the

Bureau of Land Management's

Lower Snake River District

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RIPARIAN AND WETLAND PLANT ASSOCIATONS OF SOUTHWESTERN IDAHO

WITH A FOCUS ON THE BUREAU OF LAND MANAGEMENT'S LOWER SNAKE RIVER DISTRICT

Idaho Department of Fish and Game
Idaho Conservation Data Center

Compiled by

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THE COMPILERS

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Chris Murphy is a Botanical Technician with the Idaho Department of Fish and Game, Conservation Data Center. He has a B.S. degree in Environmental Science from Western Washington University. For the last seven years, he has conducted vegetation, rare plant, and wildlife surveys throughout southwest Idaho. Prior to joining the CDC, he worked on vegetation and wildlife studies in the Snake River Birds of Prey National Conservation Area, surveyed forests and rangelands for the Interior Columbia Basin Ecosystem Management Project, and performed vegetation studies, as well as avian and herp surveys, for Idaho Power Company in Hells Canyon. With the CDC, he has worked on inventories of riparian and upland vegetation, and surveyed for rare plants, on the Owyhee Plateau, in the North Fork Clearwater, Snake, Boise, and Payette River drainages, and elsewhere.

Cyndi Coulter is a Wildlife Technician for the Idaho Department of Fish and Game, Conservation Data Center in Boise, Idaho. She is currently nearing completion of a B.A. degree in Interdisciplinary Studies from Boise State University. She has assisted Dr. Dorothy Douglas of Boise State University with *Pseudostuga menziesii* field research and served an internship with Bureau of Land Management Boise District Botanist Ann DeBolt. She joined the Conservation Data Center in Boise during the 2000 field season.

RESEARCH SUMMARY

The low elevation riparian and wetland habitats of southwestern Idaho are the least studied of anywhere in the state in terms of classification of plant associations. Although, many wetland and riparian classifications from adjacent, mostly higher-elevation portions of Idaho and surrounding states may be applicable, unique environmental and physical conditions contribute to the formation of undescribed types. Currently, Bureau of Land Management managers in southwestern Idaho have no useful communication tool (*i.e.*, standardized classification) to compare successional states of different watersheds, to characterize reference sites in high ecological condition, to understand site potential for Proper Functioning Condition assessments, to communicate with managers in surrounding areas, or to set ecological goals for riparian and watershed health.

This project assessed the diversity of wetland and riparian plant associations on the Lower Snake River District through field inventory and sampling. High quality references areas, such as Bureau of Land Management Areas of Critical Environmental Concern and Research Natural Areas, and private conservation lands of The Nature Conservancy were sampled. From these inventories, a guide to the riparian plant associations of southwestern Idaho including a key to their identification and supporting descriptive material was compiled.

This modest project involved three phases that began in 1998 with a riparian community inventory of 14 reference areas managed by the Bureau of Land Management in southwestern Idaho (Moseley 1998). It was expanded with Phase 2 in 1999 to include three additional studies whose objectives included: 1) a second year of inventory work in 16 selected reference areas; 2) a study of the stream and riparian conditions on the Rocking M Wildlife Conservation Easement Area in Hells Canyon; and 3) an ecological assessment of the 45 Ranch Allotment funded by The Nature Conservancy (Moseley 1999). The final and third phase of the project presented here includes data from inventories at additional reference areas and integration of data from related projects in southwest Idaho (Jankovsky-Jones *et al.* 2000, Rust et al. 2000).

Multivariate analysis of riparian plot data, along with subjective evaluation of community observations, was used to identify plant associations within the study area. Ninety-nine plant associations were identified in southwestern Idaho during the three phases of this project. Of these, 23 are considered tentative, where confidence in their classification certainty is low. This report is a guide to the wetland and riparian plant associations in southwestern Idaho.

ACKNOWLEDGEMENTS

The first two phases of this project were completed by Robert (Bob) K. Moseley formerly of the Idaho Conservation Data Center. Much of the information was originally summarized by Bob in previous reports to the Bureau of Land Management and is reproduced here with minor edits. In previous reports Bob acknowledged the assistance of Jim Klott, Jack LaRocco, and John Doremus from the Lower Snake River District of the Bureau of Land Management, and Jerry Scholten of the Idaho Department of Fish and Game for assistance in identification of reference areas.

Most of the field inventories were completed by Bob with the assistance of Michael Mancuso and Chris Murphy of the CDC. Additional data from related projects provided by Steve Rust and Mabel Jankovsky-Jones contributed to the description of wetland and riparian habitats in southwestern Idaho.

The compilation of this report was a team effort carried out by several staff members at the CDC. Cyndi Coulter entered field data and formatted association descriptions, photos, and stand tables for this document. Association descriptions were prepared by Bob, Chris, and Mabel. Chris also completed numerous sections of text including the study area description, several tables, the species list, the key to plant associations, and the bibliography. Mabel conducted the data analysis and interpretation, developed stand tables, completed sections of the report, and managed the many little details related to production. Careful editorial review was provided by Terry Vernholm of Idaho Department of Fish and Game and Ann Debolt with the Bureau of Land Management. Renai Brogden of Idaho Department of Fish and Game designed the document cover. Jared Hodges of Idaho Department of Fish and Game provided technical computer support. Bart Butterfield of Idaho Department of Fish and Game helped with the GIS map in Figure 1. Melinda Rittacco with the Bureau of Land Management provided assistance with preparation of this document for priniting.

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INTRODUCTION

This report is the third and final phase of a project to inventory and describe the wetland and riparian plant associations in southwest Idaho. Much of the background information, methods, and inventory results summarized by Moseley (1998, 1999) during the first two phases apply. Information from previous years has been included here verbatim and with minor updates and edits to provide a single reference to the preliminary work completed during the first two phases of this project.

The riparian and wetland plant associations of southwestern Idaho are the least known of anywhere in the state, in terms of classification of plant associations for management and biodiversity conservation purposes. Classifications done elsewhere in Idaho, as well as in adjacent Oregon,Washington, Utah, Wyoming, Montana, and Nevada, may be useful for identifying riparian types in southwestern Idaho, but their usefulness is only now being tested. While many types described in these classifications are applicable, unique environmental and physical conditions contribute to the formation of undescribed types that might be endemic to the area.

The project has been completed in three phases as a step towards filling gaps in our knowledge of riparian ecosystems in Idaho. The phases, goals and products are as follows:

Phase 1 – The goal of Phase 1 was to assess the diversity of wetland and riparian areas in the Lower Snake River District Bureau of Land Management (LSRD BLM) through field inventory and sampling of high quality reference areas. The results were summarized in *Riparian and Wetland Community Inventory of 14 Reference Areas in Southwestern Idaho* (Moseley 1998).

Phase 2 – The project was extended in Phase 2 to include a second year of inventory work at 16 additional reference sites and a summary of riparian inventory results from studies of ecological condition of streams at Rocking M Wildlife Conservation Easement Area and the 45 Ranch Allotment. Phase 2 results were summarized in *Riparian and Wetland Communities in Southwestern Idaho: Second-Year Inventory Results and Preliminary Catalog of Community Types* (Moseley 1999).

Phase 3 – The third and final Phase of the project is summarized here and includes inventories at additional reference sites, a multi-variate analysis of data collected at reference sites, and development of plant association descriptions using the Community Characterization Abstract (CCA) module of the Biological and Conservation Data System (BCD). In addition, two inventory projects underway in southwestern Idaho, Owyhee Plateau Vegetation Mapping (Rust *et al.* 2000) and Western Snake River Wetland Inventories (Jankovsky-Jones *et al.* 2000), identified a number of plant associations that are included here.

There are several implications of the project for management of riparian systems by the BLM:

1. This document provides BLM managers in southwestern Idaho with a communication tool (*i.e.*, standardized classification) to compare successional states of different watersheds, to characterize reference sites in high ecological quality, to understand site potentials for *Proper Functioning Condition* assessments, to communicate with managers in surrounding areas, and to set ecological goals for riparian and watershed health.

2. A system of reasonably well-understood reference areas on the LSRD, from which riparian management guidelines can be developed, have been identified. The BLM has established many Areas of Critical Environmental Concern (ACEC) and Research Natural Areas (RNA) throughout the state, in general, and the LSRD, in particular. These sites were primarily established to protect biotic elements, including riparian and wetland communities. Another purpose of these special designations is to create ecological reference areas (Federal Committee on Ecological Reserves 1977; Johnson *et al.* 1984), a resource that few managers in Idaho have taken advantage of. In

addition, other reference sites, such as exclosures, can be used as baselines to assess rangeland, including riparian, management (Laycock 1975; Turner *et al.* 1980; Allen 1986).

3. Many streams on BLM land in southwestern Idaho are listed as water quality limited streams by the EPA. This project will help the BLM to raise the water quality of these streams as water quality management is directly correlated with riparian management.

4.This assessment will aid the BLM's "coarse filter" biodiversity conservation efforts (USDI-BLM 1992), that is, conservation of the community and ecosystem level of biological organization (Noss 1990; Grossman *et al.* 1994). By contrast, long-standing programs to conserve special status plants and animals take the complementary "fine filter" approach to biodiversity conservation and are aimed primarily at the lower levels of organization (genes, populations, and species). See Rust (1997) for an expanded review of community concepts and their application for biodiversity conservation.

OBJECTIVES

The purpose of this project is to assess the diversity of wetland and riparian communities of the LSRD through field inventory and sampling, using ACECs, RNAs, exclosures, and other potential reference areas as the primary inventory sites. From these inventories, we have prepared a guide to the riparian types of southwestern Idaho, which includes a key to their identification and supporting descriptive material for each community. The work will help fill in gaps in our knowledge of riparian and wetland communities in Idaho and it complements inventories being conducted by the Conservation Data Center (CDC) throughout the rest of the state (*e.g.*, Jankovsky-Jones 1996; 1997a; 1997b; 1997c, 1999a, 1999b).

STUDY AREA

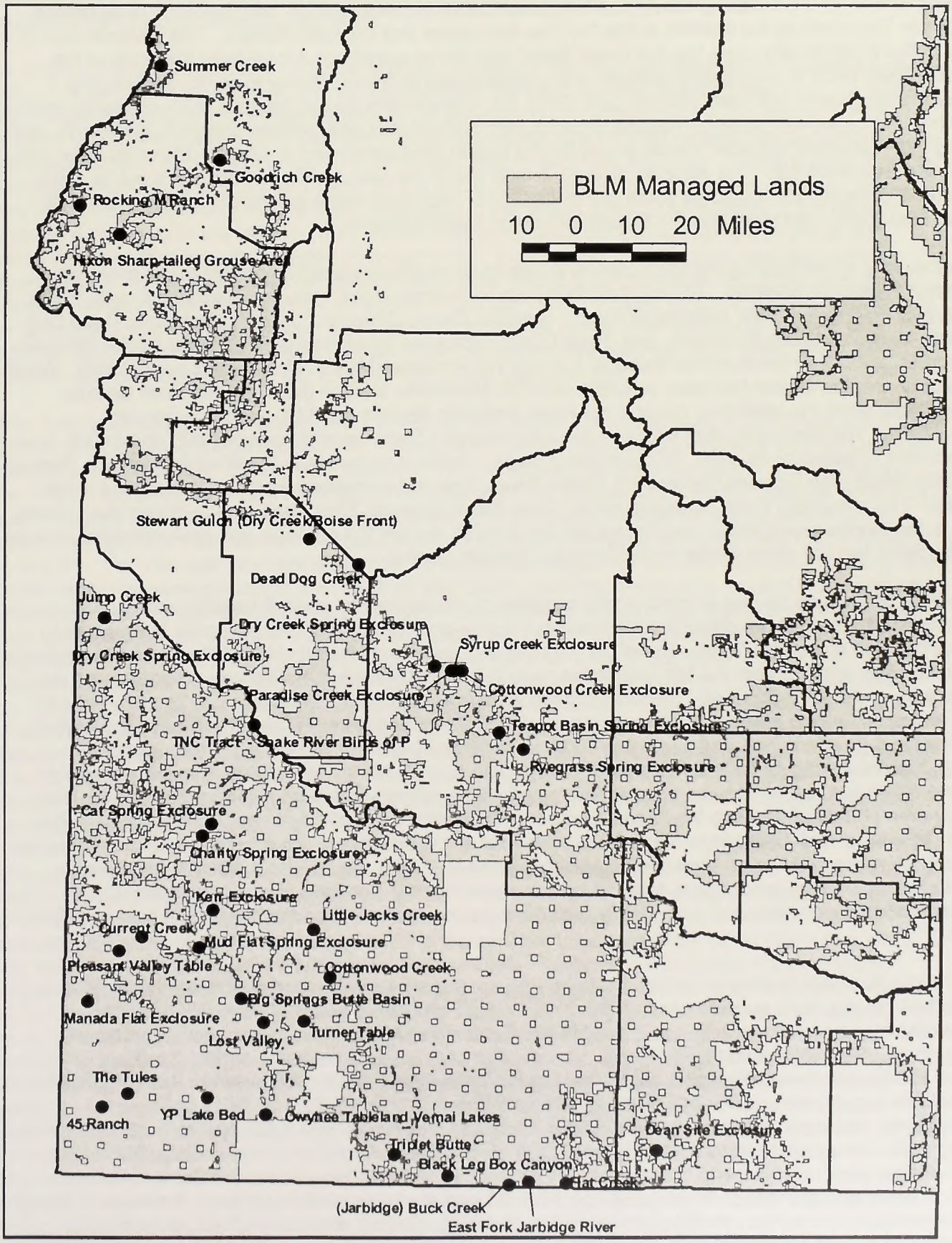
Geopolitical Location

Riparian, wetland, and ephemeral wetland vegetation was sampled at 36 reference areas distributed throughout the BLM's LSRD. Reference areas located wholly or mostly on BLM land were preferred, though many sites included some other landowners [(e.g., Idaho school-trust lands, Idaho Department of Fish and Game (IDFG), The Nature Conservancy(TNC), United States Forest Service(USFS)]. The study area corresponded to the boundaries of the LSRD (Figure 1). The western boundary of the LSRD extends along the Idaho/Oregon border from southern Hells Canyon in Adams County south to the Nevada border in Owyhee County. The southern boundary is the Idaho/Nevada border from Oregon east to Salmon Falls Creek in Twin Falls County. The eastern border follows Salmon Falls Creek north to the Snake River, follows the Snake River to near Glenns Ferry, and then continues north roughly paralleling the Elmore/Camas County border into the Danskin Mountains. Although the LSRD includes all of Boise and Valley counties, there is very little BLM land in these counties and none of our sampling sites were located there. In addition, no suitable reference areas were identified in Canyon (very limited BLM land), Gem, or Payette counties. The northern boundary of the LSRD is the Idaho County border.

Geographic, Ecoregional, Geologic, and Climatic Setting

The LSRD study area covers a vast geographic region with a diversity of geologic and ecologic settings. For example, the northeast quarter is within the Idaho batholith and characterized by the granitic ranges of the Boise and Salmon River mountains that are deeply dissected by perennial streams and rivers. The northwest quarter includes the geologically complex West and Hitt mountains which are separated by the Weiser River basin with its basaltic plateaus and lacustrine sediments. The central section of the LSRD is an ecological transition region where large river systems (the Boise, Payette, and Weiser) leave the mountains, and their relatively lush forest and shrub-steppe ecosystems, to enter the hot, dry low-lying Snake River Plain. This section stretches from the foothills of the northern mountains, across the basaltic

FIGURE 1. LOCATION OF REFERENCE AREAS SAMPLED IN SOUTHWESTERN IDAHO.



plain, with its sagebrush-steppe, agricultural, and urbanized landscapes, to the Snake River canyon. The Snake River canyon and lowlands in the LSRD are the hottest and driest areas in Idaho and are characterized by shadscale-greasewood dominated benches, alkaline flats, and badlands of lacustrine deposits that reach to the foothills of the Owyhee Mountains and Owyhee Plateau. The southern half of the LSRD is floristically more like the Great Basin than the mountains and foothills to the north of the Snake River but it is geologically unique. It is characterized by the northwest to southeast trending Owyhee Mountains, with their granitic core along the northwestern part of the area, surrounded by vast juniper and sagebrush covered volcanic uplands with numerous ridges, mesas, plateaus, tablelands, and canyons. Perennial streams, vernal lakebeds and playas, and ephemeral drainages all collect snow melt and occasional rainfall. The volcanic plateau, mostly basalt capped rhyolite formations, is cut by many dramatic canyons and stretches south to the foothills of basin and range mountains including the Bull Run, Mahogany, Jarbidge, and Elk Mountain/Salmon Falls Highlands.

Another way of interpreting the landscape is to use an ecoregional classification that maps areas of uniform ecological potential. The eight northernmost reference areas, including Goodrich Creek, Hixon Sharp-tailed Grouse Area, Rocking M Ranch, Summer Creek, Cottonwood Creek Exclosure, Dead Dog Creek, Paradise Creek Exclosure, and Syrup Creek Exclosure, lie within Bailey's Middle Rocky Mountain Steppe-Coniferous Forest-Alpine Meadow Ecoregional Province (M332) (McNab and Avers 1994). Within this province, the former four sites lie within the Blue Mountains Section (M332G) and have basaltic substrates, while the latter four occur in the Idaho Batholith Section (M332A) and have granitic substrates. The remaining sites lie within the Intermountain Semi-desert Province (342) and mostly have substrates of basalt or rhyolite. All but three of these reference areas are in the Owyhee Uplands Section (342C), which also includes the western Snake River Plain and immediate foothills (McNab and Avers 1994). The remaining three reference areas, Dean Site Exclosure, Flat Creek, and Jarbidge Buck Creek, are in the Northwestern Basin and Range Section (342B), though the geologic and environmental settings of the latter two are more similar to the Owyhee Uplands Section.

The Blue Mountains Section is geologically complex, characterized by uplifted basaltic plateau and accreted terranes that are dissected by numerous spring and precipitation fed perennial streams and rivers (McNab and Avers 1994). Relief can be dramatic, such as at the Rocking M Ranch site in southern Hells Canyon ranging from the Hitt Mountains (over 5,800 feet elevation) to Brownlee Reservoir on the Snake River (under 3,000 feet). Reflecting these altitudinal extremes, the climate can be quite variable. For example, lower elevations such as along the Snake River and lower Weiser River, have somewhat mild winters (low temperatures averaging 16 to 18 degrees F) and hot and dry summers (high temperatures averaging 89 to 91 degrees F) (Abramovich *et al.* 1998). Mountainous areas, generally above 5,000 feet, have cold and snowy winters and mild summers (Johnson and Simon 1987). In the study area portion of the Blue Mountains Section, precipitation generally averages from 12 to 20 inches (e.g., at Weiser and Cambridge respectively) per year at low elevations, but is between 30 and 50 inches at high elevations with large snowpacks (Abramovich *et al.* 1998). Below about 4,000 feet elevation, about half of the total precipitation falls during the winter months, but there is another, slightly lower precipitation peak in May and June, partly generated by convectional thunderstorms (Johnson and Simon 1987).

The Idaho Batholith Section is defined by its underlying granitic substrate and characterized by numerous mountain ranges, both glaciated and unglaciated (McNab and Avers 1994). The region is highly dissected by numerous snowmelt and rain fed perennial streams and rivers, some of which meander through montane valleys and basins while others carve deep, rugged canyons. Within the study area, some valleys have been filled with basalt flows and lacustrine sediments. In the Idhao Batholith Section, elevations range from under 3,000 feet (e.g., Payette River) to over 10,000 feet (e.g., Sawtooth Mountains). However, sampled reference area elevations only range from 3,650 feet at Dead Dog Creek in the Boise Mountain foothills to 4,650 feet at Cottonwood Creek Exclosure in the Danskin Mountains. The closest weather stations to these reference areas (Lucky Peak Dam, Arrowrock Dam, Anderson Ranch Dam, and townsite of Prairie) average 14 to 23 inches of precipitation per year, the majority falling as snow during the winter months (Abramovich *et al.* 1998). Overall, sites below 5,000 feet elevation experience cool to somewhat mild winter temperatures (average low temperatures between 13 and 22

degrees F) but hot and dry summers (average high temperatures between 87 and 91 degrees F) (Abramovich *et al.* 1998). Elsewhere in the LSRD, precipitation amounts at high elevations with large snowpacks can be over 60 inches per year.

The Owyhee Uplands Section is drier and warmer throughout the year than neighboring sections to the north. This section is geologically diverse and includes the loess covered basaltic plateau of the western Snake River Plains (and immediate foothills of the Boise and Danskin mountains and Weiser basin) and the lower Boise and Payette River valleys. It also includes the Snake River canyon and surrounding low-lying badlands and benches of eroded lacustrine and alluvial sediment deposits. The fault block Owyhee Mountains, with their granitic core, as well as the volcanic escarpment of the Owyhee Plateau, rise abruptly from the desert-like setting to the southwest of the Snake River. The majority of the section, however, is made up of the widespread Owyhee Plateau uplands composed mainly of rhyolitic and welded tuff flows that are often capped by basalt flows. Erosion and fault blocking have formed high mesas, tablelands, and plateaus interspersed by shallow basins or cut by massive, narrow canyons. Numerous streams and springs in the canyonlands are perennial. Though total precipitation is generally low, drainage on the shallow, eroded loess soils of the plateau can be poor due to soil clay-pans or bedrock. As a result, numerous ephemerally moist drainages or vernally wet pool, lakes, and playas can be found collecting spring snowmelt or runoff from large rainfall events.

While total relief ranges from as low as 2,100 feet on the Snake River to as high as 8400 feet in the Silver City Range of the Owyhee Mountains, the majority of the section (generally congruent with the Owyhee Plateau) is found between 3,000 and 6,000 feet. This is reflected by the elevations of most reference sites with all but three sites between 2,600 and 6,050 feet. Throughout the Owyhee Uplands Section at these moderate elevations, precipitation is generally low (averaging between 9 and 14 inches on the western Snake River Plain and most of the Owyhee Plateau), winters are generally mild, and summers hot and dry. For example, average winter low temperatures range from 16 to 23 degrees F while average summer high temperatures range from 85 to 93 degrees F. Portions of two sites located in the uplifted highlands around Juniper Mountain (e.g., Manada Flat Exclosure and Current Creek) are found above 6,100 feet elevation. At elevations above 6,000 feet in the juniper and mountain big sagebrush zone, precipitation is about 15 to 20 inches per year, the majority from snow accumulation. The TNC Tract at Snake River Birds of Prey on the Snake River is the lowest site in this section at 2,320 feet and has a very hot and dry climate. For example, this site typifies the low elevation shadscale-greasewood zone around the Snake River, stretching from about Marsing to Hammett. Winters are mild (with low temperatures averaging between 20 and 24 degrees F), summers very hot (average high temperatures 91 to 96 degrees F), and precipitation very low (only 7 to 8 inches per year). Precipitation in the Owyhee Uplands Section generally has a pronounced dual peak, one in January and another in May and June due to convectional thunderstorms.

Although more extensive in southeast Oregon, northern Nevada, southeast Idaho, and northern Utah, a sliver of the Northwest Basin and Range Section is found in the study area along the southern margin of the LSRD. In the LSRD, the Northwest Basin and Range Section is composed of the foothills and associated canyons of fault block ranges forming the northern boundary of the Great Basin (e.g., Bull Run, Mahogany, Jarbidge, and Elk Mountain/Salmon Falls Highlands). The ranges are geologically complex. However, in the LSRD they generally have broadly sloping northern flanks of uplifted rhyolitic and/or basaltic plateaus and are deeply incised by streams and rivers flowing out of the mountains into the adjacent Owyhee Uplands. Perennial watercourses include larger streams (e.g., the Bruneau and Jarbidge rivers, Salmon Falls Creek), smaller creeks (e.g., Buck Creek and Flat Creek), and springs. The lower elevation canyons (5,280 to 6,000 feet) formed by these streams have a high environmental similarity with those on the Owyhee Plateau. The climate is most similar to the cooler and moister portions of the Owyhee Uplands (e.g., average annual precipitation 12 to 16 inches per year with summer high temperatures in the upper 80s F) (Abramovich *et al.* 1998). In the LSRD, the higher elevation spring fed creeks and meadows (e.g., Dean Site Exclosure at 6,600+ feet elevation) are distinctly Great Basin montane, being below subalpine fir but within the aspen-mountain mahogany-mountain big sagebrush mosaic. At these elevations, snowpack accumulation is common, and average annual precipitation can be over 24 inches per year (Abramovich *et al.* 1998).

METHODS

Field Methods

Reference Areas and Sample Sites

Reference areas were located in all three Field Offices of the LSRD (Figure 1; Table 1). The goal was to focus sampling on relatively natural stands of vegetation. The majority of reference areas sampled (19) were located in the Owyhee Field Office. Thirteen reference areas were located in the Four Rivers Field Office while only four reference areas were sampled in the Jarbidge Field Office. Of these reference areas, 12 were sampled in 1997 (Moseley 1998), 18 were sampled in 1998 (Moseley 1999), and 6 were added from other CDC riparian and wetland work during the 1999-2000 field seasons (Rust *et al.* 2000). Twelve of the 36 reference areas were located in ACECs, Outstanding Natural Areas (ONAs), RNAs, or Wilderness Study Areas (WSAs) (Table 1). Thirteen reference areas were protected from livestock grazing by exclosures, 3 were located in high quality areas managed for wildlife habitat, and 3 were protected wholly, or in part, by TNC. Eight reference areas included high quality drainages or ephemeral wetlands that are not formerly protected, but are only lightly disturbed by livestock grazing or other activities due to natural protection such as cliff bands or dense brush. Due to time constraints only cursory surveys were conducted at Big Springs Butte Basin, Current Creek, Lost Valley, and the Manada Flat Exclosure. They were included due to the high quality wetlands, riparian areas, and ephemeral wetlands.

In 1998, the BLM funded a study of the stream and riparian conditions on the Rocking M Ranch Wildlife Conservation Easement Area, a large area in southern Hells Canyon cooperatively managed by the BLM, Idaho Department of Fish and Game, and a private landowner (Moseley 1999). The results of the community inventory portion of the project were included in this study to supplement other riparian and wetland sampling in southwest Idaho. The Rocking M Ranch has been grazed for many years and in some drainages woody riparian vegetation is replaced by weedy herbaceous species (Moseley 1999). Nevertheless, proper grazing management can promote recovery and reestablishment of woody riparian vegetation. Thus, the Rocking M Ranch serves as an experimental and restoration reference area where changes in management can be documented as opposed to representing high quality wetland and riparian habitat. Another study in 1998 involved a riparian inventory of the nearly 70,000 acre 45 Ranch Allotment managed by TNC (Moseley 1999). Riparian and wetland vegetation surveys included the South Fork Owyhee River (from Nevada to the confluence with the East Fork), the intermittent Little Owyhee River (from Star Valley to the confluence with the South Fork), alluvial terraces, exclosures, and perennial springs and seeps. Ephemerally moist drainages and washes, as well as vernal pools, lakes, and playas, were also surveyed. Although grazed by livestock for many years, the majority of the riparian and wetlands on the allotment are in good to excellent condition and serve well as reference areas (Moseley 1999).

The 36 reference areas are widely distributed (geographically, geologically, and by latitude and altitude) and capture a diversity of riparian and wetland associations and environmental settings (Figure x), but this is not a complete list. There is a notable under representation of reference areas in the Jarbidge Resource Area, the Payette River watershed (including Big and Little Willow creeks and Squaw Creek), and at lower elevations of the Weiser River Basin. This under representation is the function of the long history of disturbance in these areas, the large amount of private land (relative to BLM land), the need for additional (and regularly maintained) livestock exclosures, and need for further surveys. Furthermore, north of the Snake River, the distribution of BLM lands limited sampling to sites below 5800 feet elevation and excluded the broad montane valley habitats of Valley County. BLM parcels along the North Fork Payette River in Long Valley were not surveyed but may provide some valuable information on *Populus trichocarpa* associations. Several other potential reference areas were not sampled due to time constraints (e.g., Castlehead Springs Exclosure on Juniper Mountain in the Owyhee Uplands).

Several potential riparian and wetland reference areas in the LSRD were excluded from this study because they were wholly or mostly not on BLM land (e.g., Ada County or Boise City parks, IDFG Wildlife Management Areas, Idaho Power lands, and Idaho State Parks). However, many of these areas have been surveyed as part of Environmental Protection Agency funded inventories of high quality wetlands and riparian areas in Idaho (Jankovsky-Jones *et al.* 2000). During 1999 and 2000 CDC staff inventoried the low elevation wetlands and riparian areas immediately surrounding the main-stems of the Snake River, Boise River (below Lucky Peak Dam), and Payette River (below Horseshoe Bend). Compositional and structural descriptions of riparian and wetland plant associations made during these surveys have been included in this report to compensate for geographic gaps in the distribution of sampling sites in the LSRD. Community observations are included from the following sites (referred to as "Western Snake River Wetland Inventories"):

- Boise River (Barber Pool to Garden City)
- C.J. Strike Wildlife Management Area
- Lake Lowell/Deer Flat National Wildlife Refuge
- Eagle Island State Park
- Fort Boise Wildlife Management Area
- Roswell Slough
- Payette River (Birding Islands Wildlife Management Area and Montour Wildlife and Recreation Management Area)
- Snake River (Bancroft Spring, Halverson Lake and Springs, Rabbit Creek Springs, and Thomas Flat Springs, Three Island Crossing)

Another on-going CDC project, funded by the U.S. Air Force, involves modeling and sampling vegetation in the southern two-thirds of Owyhee County (roughly south of the line from South Mountain to Saylor Creek). The Owyhee Plateau Vegetation Mapping project main focus is surveying upland and ephemerally moist vegetation types important for sage grouse (Rust *et al.* 2000). In addition to ephemerally moist areas, some perennial or seasonally wet areas were also surveyed. The Big Springs Butte Basin, Current Creek, Lost Valley, Manada Flat Exclosure, Owyhee Tableland Vernal Lakes, and Turner Table reference areas were identified through this work. The Castlehead Springs Exclosure (near Rough Mountain) was also identified as a potential reference area but was not surveyed. Compositional and structural descriptions of high quality riparian, wetland, and ephemeral wetland vegetation were included in this study as a supplement. Owyhee Plateau wetland, riparian, and ephemeral wetland survey sites include the following:

- Grasmere (Buster Butte, Louse Creek)
- Duck Valley (Blue, Payne, and Shoofly creeks and surrounding wet meadows and ephemeral wetlands)
- Marys Creek
- North Fork Owyhee River
- Sheep Creek (Rizzi Spring)
- Three Creek

TABLE 1. REFERENCE AREAS SAMPLED IN SOUTHWESTERN IDAHO FOR RIPARIAN, WETLAND, AND EPHEMERAL WETLAND PLANT ASSOCIATIONS. SITES ARRANGED BY COUNTY. SITE NUMBER REFERS TO THE RECORD NUMBER USED IN THE CONSERVATION DATA CENTER DATA BASE. SITE NAMES FOLLOWED BY AN (*) REPRESENT THOSE WHERE COMMUNITY SAMPLING DID NOT TAKE PLACE AS THE STANDS OF VEGETATION WERE VERY HETEROGENEOUS.

Site #	Site Name	Management Status	Location (Lat/Long)	Elevation (ft.)	County	Ecoregion Section	Field Office	Land Ownership
8911	Dead Dog Creek	Boise River Wildlife Management Area	433707N 1160104W	3560-3960	Ada	Idaho Batholith	Four Rivers	BLM/USFS
238	Stewart Gulch	ACEC	434100N 1161200W	2990-3793	Ada	Owyhee Uplands	Four Rivers	BLM/Idaho
378	Snake River Birds of Prey (TNC Tract)	TNC preserve; National Conservation Area	431130N 1162250W	2320-2325	Ada	Owyhee Uplands	Four Rivers	TNC/BLM
107	Goodrich Creek	RNA/ACEC	444015N 1163435W	3120-3867	Adams	Blue Mountains	Four Rivers	BLM
214	Summer Creek	BLM established RNA USFS Proposed RNA	445450N 1164800W	4600-5257	Adams	Blue Mountains	Four Rivers	BLM/USFS
387	Cottonwood Creek Exclosure*	Exclosure; 40+ years	432048N 1153803W	4640-4650	Elmore	Idaho Batholith	Four Rivers	BLM
393	Dry Creek Spring Exclosure	Exclosure	432131N 1154405W	4560-4600	Elmore	Owyhee Uplands	Four Rivers	BLM
386	Paradise Creek Exclosure*	Exclosure; 30+ years	432043N 1154026W	4320-4340	Elmore	Idaho Batholith	Four Rivers	BLM
37	Ryegrass Spring Exclosure	Exclosure; 40+ years	430841N 1152417W	4120-4200	Elmore	Owyhee Uplands	Four Rivers	BLM
9	Syrup Creek Exclosure	Exclosure; 10 years	432049N 1153947W	4110-4280	Elmore	Idaho Batholith	Four Rivers	BLM
394	Teapot Basin Spring Exclosure	Exclosure; 30+ years	431109N 1152952W	4160-4200	Elmore	Owyhee Uplands	Four Rivers	BLM
509	Big Springs Butte Basin	High quality ephemeral wetlands; unprotected	422815N 1162350W	5750-6010	Owyhee	Owyhee Uplands	Owyhee	BLM
52	Black Leg Box Canyon	Exclosure	420418N 1154944W	5400-5600	Owyhee	Owyhee Uplands	Owyhee	BLM
39	Cat Spring Exclosure	Exclosure; 40+ years	425544N 1163125W	4480-4520	Owyhee	Owyhee Uplands	Owyhee	BLM
41	Charity Spring Exclosure	Exclosure; 30-50+ years	425352N 1163300W	5560-5650	Owyhee	Owyhee Uplands	Owyhee	BLM

Table 1. continued.

69	Cottonwood Creek	RNA/ACEC	423205N 1160450W	4600-5380	Owyhee	Owyhee Uplands	Owyhee	BLM
501	Current Creek	Wilderness Study Area; ONA	423737N 1164520W	5250-6750	Owyhee	Owyhee Uplands	Owyhee	BLM
50	East Fork Jarbidge River	High quality drainage; unprotected	420026N 1152053W	5200-5900	Owyhee	Owyhee Uplands	Jarbidge	BLM
390	45 Ranch	TNC Preserve and Allotment	421030N 1165230W	4330-4904	Owyhee	Owyhee Uplands	Owyhee	TNC/BLM
384	Flat Creek	High quality drainage; unprotected	420020N 1151307W	5600-6000	Owyhee	Northwestern Basin and Range	Jarbidge	BLM
392	Buck Creek	High quality drainage; unprotected	420006N 1152513W	5280-5650	Owyhee	Northwestern Basin and Range	Jarbidge	BLM
132	Jump Creek	ACEC	432745N 1165600W	2600-3905	Owyhee	Owyhee Uplands	Owyhee	BLM
381	Kerr Exclosure	Exclosure; 15 years	424220N 1163025W	5840-5880	Owyhee	Owyhee Uplands	Owyhee	BLM
145	Little Jacks Creek	RNA	423943N 1160837W	4060-5280	Owyhee	Owyhee Uplands	Owyhee	BLM
510	Lost Valley	High quality ephemeral wetlands; unprotected	422433N 1161856W	5250-5775	Owyhee	Owyhee Uplands	Owyhee	BLM
N/A	Manada Flat Exclosure	Exclosure	422707N 1165627W	6045-6150	Owyhee	Owyhee Uplands	Owyhee	BLM
385	Mud Flat Spring Exclosure	Exclosure; 40 years	423614N 1163257W	5720-5725	Owyhee	Owyhee Uplands	Owyhee	BLM
506	Owyhee Tableland Vernal Lakes	High quality ephemeral wetlands; unprotected	421000N 1161730W	5300-5780	Owyhee	Owyhee Uplands	Owyhee	BLM
1594	Pleasant Valley Table	RNA/ACEC	423520N 1165005W	5300-5650	Owyhee	Owyhee Uplands	Owyhee	BLM
258	The Tules	RNA/ACEC	421227N 1163010W	4700-5100	Owyhee	Owyhee Uplands	Owyhee	BLM
256	Triplet Butte	RNA/ACEC	420115N 1153815W	4660-6013	Owyhee	Owyhee Uplands	Owyhee	BLM

Table 1. continued								
N/A	Turner Table	High quality unprot. Ephemeral wetlands;	422500N 1161000W	5700-6052	Owyhee	Owyhee Uplands	Owyhee	BLM
371	YP Lake Bed	High quality ephemeral wetlands; unprotected	421248N 1164705W	5180-5181	Owyhee	Owyhee Uplands	Owyhee	BLM
53	Dean Site Exclosure	Exclosure; 0-30 years	420550N 1145347W	6600-6700	Twin Falls	Northwestern Basin and Range	Jarbidge	BLM
123	Hixon Sharp-tailed Grouse Area	RNA/ACEC; Habitat Mgt. Area; TNC preserve	442800N 1165600W	3100-5400	Wash.	Blue Mountains	Four Rivers	TNC/BLM
2733	Rocking M Ranch	Wildlife Conservation Easement Area	443220N 1170445W	3000-5800	Wash.	Blue Mountains	Four Rivers	BLM/Private

Field Data Collection

During the field inventory, information was collected using a standard set of CDC forms (Appendix 1) for both the site and the individual plant associations:

Site Information - Site Survey Forms were used for documenting information on site location, occurrences of plant associations and rare species, general site description, key environmental factors, biodiversity significance, and management needs. The Site Survey Form in Appendix D provides more details.

Plant Associations – Sites were surveyed from vantage points and/or on foot to identify major vegetation types. For each major vegetation type or plant association in the site one of two forms was used to document its occurrence. Most associations were sampled using a 10 X 10 meter plot to document the community's composition, structure, and environmental condition. Occasionally plot dimensions were varied for linear stands (20 X 5 meters) or a smaller plot was used for smaller stands of vegetation. The plots were placed in homogeneous stands of vegetation that best represented the vegetation mosaic within the site. Standard ecological sampling techniques developed by Natural Heritage and Conservation Data Centers in the western U.S. were used (Bourgeron *et al.* 1992). Forms used for these plots correspond to Form II (Community Survey Form) and Form III (Ocular Plant Species Data) in Appendix D. An abbreviated form, called the Idaho Community Observation Form (Appendix D) was typically used to document types encountered where the composition and structure is well known in Idaho, when time was limited, and for Western Snake River Wetland Inventories. In a few sites, Helen Fisher of the BLM completed soils descriptions for plots (Fisher and Moseley 1997). Otherwise only general soils information was collected.

Office Methods

Data Analysis

Ocular plant species data collected during the first two years of this project were temporarily assigned to plant associations based on comparisons to existing classifications in Idaho and adjacent states (Moseley 1998, 1999). To elucidate further information, composition data from the 182 plots collected during the first two phases of these projects were entered into an Excel spreadsheet. Canonical community ordination (CANOCO) was applied using Canonical Correspondence Analysis (Ter Braak 1988) using all species and all plots. Cluster analysis is a classification method which groups stands based on similarity. Cluster analysis was applied using SYSTAT software (1994). Ordination and classification were used to determine groups of plots with similar floristic composition and cover. Stand tables were then arranged based on similarity and subjective analysis of groups, including consideration of existing classifications. These were used to determine plant associations, community types, and dominance types.

The 182 plots were classified into 62 different groups most of which represented distinct vegetation types or plant associations. Where species composition, average cover, and constancy were similar stands were considered to be of the same plant association. Several of the vegetation types were represented by a small number of stands (or single stands). Some of these stands were well documented in the literature and were considered synonomous. Otherwise stands were considered tentative plant associations that are undescribed in existing classifications and have limited supporting information. The tentative types include two that are dominated by *Juniperus* spp. and a stand dominated by *Prunus emarginata*. Two groups represent aquatic communities which for the most part have not been the focus of existing classifications. Other tentative types include stands of *Scirpus pallidus, Carex sheldonii,* and *Sarcobatus vermiculatus/Poa secunda*. Three groups of the vegetation stands represent community types where exotic species are abundant or dominant. In addition there was a group of 6 stands dominated by *Populus tremuloides* with mixed tall shrubs and a somewhat weedy understory that did not clearly align with other stands.

Thirty-seven additional plant associations were added to Table 1 based on observations (as opposed to plots) by Moseley (1998, 1999) and surveys that were carried out as part of the Western Snake River Wetland Surveys (Jankovsky-Jones *et al.* 2000) and Owyhee Plateau Vegetation Mapping Project (Rust *et al.* 2000). Of the observations approximately one-half are tentative plant associations. The tentative associaitons include stands that are poorly documented in the literature and/or that are documented with limited data in Idaho and/or stands that have a high level of human impacts. Six of the tentative associations are stands of willows at low elevations where cumulative effects including hydrologic manipulation and ground disturbances were evident and non-native species were abundant. Six stands were low elevation stands dominated by native grasses that are poorly described in the riparian literature. Three of the tentative types were in vernal pools. Other observations included stands of *Ribes aureum* along with disturbance induced types.

Site and Community Data Bases

Field data were entered into the Biological and Conservation Data System (BCD) at the CDC. The three modules of the BCD described below were the primary ones used for managing and reporting site and community information.

Site Basic Record (*SBR*) - This module is used to manage information about important biodiversity conservation sites in the state. The Site Survey Form, mentioned above, was developed to mirror the SBR. Numerous fields are contained in a SBR and are included under such headings as Location, Site Description, Site Design (including boundary description), Site Significance (ratings for biodiversity significance, protection urgency, management urgency, etc.), Protection, Stewardship, and References. Also, all community and rare species occurrences are automatically populated in the record via a relational feature from the Element Occurrence module (see below). In addition to the computer record, the site boundaries are mapped and digitized and a manual (hard copy) file is maintained for each site. These records are available on request from the CDC.

Element Occurrence Record (*EOR*) - This is the same module used to report rare species occurrences. Both species and plant communities or plant associations are "elements" of biodiversity, hence the generic name Element Occurrence Record. Information for each occurrence, in this case a community occurrence, is kept on map, computer, and manual files. The computer file contains numerous fields under such headings as Location, Status (quality, dates of observation, etc.), Description, Protection, Ownership, and Documentation (sources of information about an occurrence). As mentioned above, this module is linked to the SBR.

Community Characterization Abstract (*CCA*) - CCAs provide a short, concise account of the nomenclature, classification, environmental and functional relationships, vegetation structure and composition, and conservation status for a particular natural community. This information is compiled from all available published and unpublished sources, as well as the personal knowledge and field data collected by CDC biologists. Coupled with the statewide wetland and riparian community classifications and the occurrence data bases maintained by the CDC, CCAs are a valuable resource for developing conceptual and quantitative ecological models for individual plant associations or suites of associations on a floodplain. Our long-term goal is to populate the CCA data base for all wetland and riparian plant associations in Idaho and produce a comprehensive reference manual for biologists and managers. In the near term, CCAs are being populated for regions of the state and "mini-guides" generated for specific watersheds or similar areas.

Clarification of Terms

The terms habitat type, community type, and plant association have been applied in riparian community classifications (Youngblood *et al.* 1985; Kovalchik 1987; Hansen *et al.* 1995) and further

discussions on community concepts are available in Gebhardt *et al.* (1990) and Rust (1997). Habitat types encompass the land area that supports or has the potential to support the same climax vegetation. Community type is a general term for assemblages of vegetation that includes all seral stages including human induced, disclimax communities. Plant associations most commonly refer to climax communities or potential natural plant communities (Gebhardt *et al.* 1990) and include habitat types. However, due to the dynamic nature of riparian systems climax states may not be achieved. Kovalchik (1987) used the term riparian association to reference the latest successional stage attainable on specific riparian landforms. The units of vegetation presented here are considered plant associations that include (but are not limited to) habitat types and existing natural vegetation. The relationship of associations to riparian landforms is discussed but the level of detail is somewhat limited due to the funding and timeframe of this project

The National Vegetation Classification is a hierarchical system with the upper levels defined by physiognomic criteria such as vegetation structure (height and spacing), growth forms of dominant species, and leaf characteristics of dominant plants (Grossman *et al.* 1998). These physiognomic levels of the classification have been adopted by the Federal Geographic Data Committee as the U.S. national standard (Federal Geographic Data Committee 1997). The two lowest levels, Alliance and Association, are based on floristic composition. The term plant association, as used here, is at the finest level of the heirarchy. In addition, some of the vegetation stands encountered in southwest Idaho are considered community types that represent disclimax or disturbance induced vegetation types. Dominance types are also recognized and include stands of vegetation with limited data or stands where associated species with high fidelity are not apparent.

Associations were named based on the dominant or diagnostic species in each physiognomic layer. Species in the same layer are separated by a "-" and a "/" is used to distinguish between species in different layers. In some cases due to the heterogeneity of stands (or sparseness of stands) diagnostic species were not readily identifiable. In some of these cases a riparian landform modifier was used for naming the association. On floodplains modifiers included the terms bench and barren. Riparian benches include alluvial terraces, islands, and bars that are elevated at or just above the average annual water line. Barrens typically include alluvial bars below the high water line that are usually flooded and scoured annually.

RIPARIAN AND WETLAND FLORA

A list of all vascular plant species encountered in the riparian, wetland, and aquatic zones of the study sites was compiled. Due to time/money constraints, voucher specimens were not collected, but nearly all species were identified using a flora. Species included on the list are those species encountered in riparian, wetland and aquatic communities. Keep in mind that the riparian zone includes a broad moisture gradient and, therefore, support many species that are not considered wetland indicators. It is not uncommon, for instance, to find *Chrysothamnus nauseosus* growing beneath a late-successional cottonwood stand or *Monardella odoratissima* occurring on the stream-bed gravels of an ephemeral wash. The checklist appears in Appendix A, ordered by major plant group and family.

Several plant species of special concern have been reported from wetland and riparian habitat in southwestern Idaho. Not all of the plant species of special concern are wetland indicators. A number of these species were encountered during surveys and new populations were documented. Rare plant observation forms were completed when populations were located and the occurrences were entered into the BCD for all but the Review species. Review species are species that may be of conservation concern but adequate data documenting rarity is not available. Table 2 lists species of special concern, Global (G) and State (S) Ranks, and Status. Definitions of Ranks and Status are available online at http://www2.state.id.us/fishgame/plant.htm.

TABLE 2. PLANT SPECIES OF SPECIAL CONCERN DOCUMENTED FROM WETLAND AND RIPARIAN HABITAT IN THE SURVEY AREA (EXPLANATION OF STATUS: GP1=GLOBAL PRIORITY 1, GP2=GLOBAL PRIORITY 2, SP1=STATE PRIORITY 1, SP2=STATE PRIORITY 2, SP3=STATE PRIORITY 3, S=STATE SENSITIVE, M=MONITOR, R=REVIEW).

Species Name	Rank	Status	Plant Association and Comments
Angelica kingii	G4 S1	SP1	*Berula erecta; Phragmites australis;* perennial springs
Bacopa rotundiflora	G5 S1	R	Mud flats; recent alluvium at low water line
Calandrinia ciliata	G4 S1	R	Ephemeral drainages; recent alluvium at low water line
Camassia cusickii	G4 S2	M	*Camassia cusickii* seep; *Alnus rhombifolia/ Phildelphus lewisii*
Cleomella plocasperma	G4 SH	SP1	Historic occurrence known from *Distichlis spicata* var. *strichta* stands
Cyperus odoratus	G5 S1	R	Recent alluvium at low water line
Cyperus rivularis	G5 S1	R	*Juncus effusus;* recent alluvium at low water line
Downingia bacigalupii	G4 S2	SP1	*Eleocharis palustris; Artemisia cana*/Dry graminoid; ephemeral drainages; mudflats
Downingia insignis	G4 S1	SP1	Mudflats
Epipactis gigantea	G4 S3	SP2	Thermal and cold springs
Haplopappus uniflorus var. *howellii*	G5T1 S1	R	*Artemisia ludoviciana*; *Danthonia californica* ephemeral drainage
Juncus bryoides	G4 S1	R	Ephemeral drainages; meadows
Juncus hallii	G4G5 S2	R	*Salix* spp.; meadows; generally at upper elevations
Juncus hemiendytus	G5 S?	R	Recent alluvium at low water line
Lepidium davisii	G3 S3	GP3	*Lepidium davisii* vernal pool
Machaerocarpus californicus	G4 S2	M	*Eleocharis palustris* vernal pool; *Artemisia cana/Muhlenbergia richardsonis*
Mimulus evanescens	G2 SH	R	Ephemeral drainages
Mimulus patulus	G2 S1	GP2	*Mimulus guttatus; Camassia cusickii;* perennial springs
Mimulus ringens	G5 S1	R	Recent alluvium at low water line
Potamogeton diversifolius	G5 S1	R	Perennial open water
Potentilla paradoxa	G5 S1	R	Recent alluvium at low water line; lake and pond shores
Primula cusickiana	G4 S3	R	*Camassia cusickii* seep
Stylocline filaginea	G4 S2	M	*Artemisia (arbuscula, longiloba);* mudflats
Teucrium canadense var. *occidentale*	G5T5 S2	SP1	*Carex sheldonii; Scirpus acutus*

RIPARIAN AND WETLAND VEGETATION

Table 3 lists all of the riparian and wetland plant associations encountered in southwestern Idaho since 1997, along with their location and plot documentation. Plot forms were archived in the Plant and Community Monitoring File at the CDC. In a few cases only observation forms were filled out for the community occurrence and no plot was sampled ("obs. form" in Table 3). We identified 99 plant associations, occurring in 63 alliances. Of these, 23 plant associations were considered tentative, where confidence in their classification certainty is low, based on meager data, personal observation from field work around Idaho, and/or lack of similar communities described elsewhere. In addition,

three groups of stands were not classified and five groups were considered disturbance induced community types. A key and descriptions (including brief descriptions for the tentative types) for all of the associations listed in Table 3 are included in the next section of this document.

One of the objectives of this project was to see how well vegetation patterns fit classifications from surrounding areas (Moseley 1998). We found that these classifications tended to work the least at our lowest elevation study sites, especially on the Snake River Plain and Owyhee uplands. Geographically, however, Crowe and Clausnitzer's (1997) classification from the Blue Mountains of Oregon works well for sites north of the Snake River Plain. These sites are obviously closer to their study area, but also share ecological similarities and occur in the same ecoregional Province (Bailey 1997) and Section (McNab and Avers 1994). Overlapping this geographical pattern is an elevational gradient. We found that many existing classifications worked the best at our higher elevation sites, especially Manning and Padgett (1995) and Evenden (1989), whose study areas were mountainous regions of the Great Basin.

TABLE 3. RIPARIAN AND WETLAND PLANT ASSOCIATIONS DOCUMENTED FROM SOUTHWESTERN IDAHO DURING 1997-2000 [(T) = TENTATIVE PLANT ASSOCIATION, c.t. = COMMUNITY TYPE, AND d.t. = DOMINANCE TYPE.]

ALLIANCE	PLANT ASSOCIATION	SITE	PLOT #
Forested			
Alnus rhombifolia	*Alnus rhombifolia/Philadelphus lewisii*	Rocking M	DENN04A ROCK01A ROCK01B
		Summer Creek	obs. form
		Hixon Sharp-tailed Grouse Area	97RM030 97RM031
Populus tremuloides	*Populus tremuloides/Cornus sericea*	Dead Dog Creek	98RM033
	Unclassified *Populus tremuloides*/ Tall shrub communities	Rocking M	NDEN01A MDEN01A NFWO02A DENN02A WOLF01B RAFT01A
Populus trichocarpa	*Populus trichocarpa/Crataegus douglasii*	Western Snake River Wetland Inventories	obs. form
	Populus trichocarpa/Rosa woodsii	Rocking M	NDEN04A DENN03B WOLF04A
		East Fork Jarbidge River	98RM069
	Populus trichocarpa/Salix lasiandra	Goodrich Creek	97RM003
		Syrup Creek Exclosure	98RM061 98RM059
	Populus trichocarpa/Salix lutea	East Fork Jarbidge River	98RM068
	Populus trichocarpa/Symphoricarpos albus	Goodrich Creek	97RM002
	Populus trichocarpa/Acer glabrum	Rocking M	DENN02B
	Populus trichocarpa/Barren	Western Snake River Wetland Inventories	obs. form
	Populus trichocarpa/Poa pratensis c.t.	Western Snake River Wetland Inventories	obs. form
Salix amygdaloides	*Salix amygdaloides* d.t.	Western Snake River Wetland Inventories	obs. form
Woodland			

Juniperus occidentalis	*Juniperus occidentalis* ephemeral drainage (T)	45 Ranch	98RM077 98RM078
		Rocking M	DENN01B
Juniperus scopulorum	*Juniperus scopulorum/Elymus glaucus*	East Fork Jarbidge River	98CM006 98RM067
		Triplet Butte	OF2
	Juniperus scopulorum/Equisetum (arvense, hyemale) (T)	Buck Creek	98RM070
		East Fork Jarbidge River	98RM005
Pseudotsuga menziesii	*Pseudotsuga menziesii/Acer glabrum-Physocarpus malvaceus* Flood Plain	Rocking M	WOLF01A
	Pseudotsuga menziesii/Cornus sericea	Dead Dog Creek	98RM029
Tall Shrub			
Betula occidentalis	*Betula occidentalis/Cornus sericea*	Dead Dog Creek	98RM032
		Goodrich Creek	97RM001
	Betula occidentalis/Mesic forb	Rocking M	MDEN02A
		Jump Creek	97RM011
	Betula occidentalis/Philadelphus lewisii	Jump Creek	97RM012
	Betula occidentalis/Poa pratensis c.t.	Stewart Gulch	97RM004
Crataegus douglasii	*Crataegus douglasii/Rosa woodsii*	Hixon Sharp-tailed Grouse Area	96MM001 96MM013 96MM016
		Rocking M	TRAI01A TRAI04A TRAI05A RAFT01B
Cornus sericea	*Cornus sericea*	Flat Creek	98RM072
		Triplet Butte	97RM019
		Cottonwood Creek	97RM009
		Little Jacks Creek	obs. form
Philadelphus lewisii	*Philadelphus lewisii*	Jump Creek	97RM013
		Rocking M	RAFT01C NDEN02A
Prunus virginiana	*Prunus virginiana* d.t.	Dry Creek Spring Exclosure	98RM004
	Prunus virginiana/Elymus glaucus	Flat Creek	98RM071
		Cottonwood Creek	97RM010
		Little Jacks Creek	97RM015 97RM017
Prunus emarginata	*Prunus emarginata* (T)	Rocking M	DENN01A
Ribes aureum	*Ribes aureum* (T)	Western Snake River Wetland Inventories	obs. form
Rhus trilobata	*Rhus trilobata*	Western Snake River Wetland Inventorries	OF14
Salix exigua	*Salix exigua*/Barren	Snake River Birds of Prey (TNC Tract)	97RM021
		45 Ranch	98CM002 98CM011 98CM012
		Current Creek	99RM008a 99RM011

	Salix exigua/Mesic forb (T)	Western Snake River Wetland Inventories	obs. form
	Salix exigua/Mesic graminoid	The Tules	97RM029
		Triplet Butte	97RM018
		45 Ranch	98RM013 98RM026 98RM074 98RM075 98RM076
	Salix exigua/Poa pratensis c.t.	Black Leg Box Canyon	98RM064
	Salix exigua/Rosa woodsii (T)	Owyhee Plateau Vegetation Mapping	obs. form
Salix geyeriana	*Salix geyeriana/Carex utriculata*	Charity Spring Exclosure	98RM040
		Mud Flat Spring Exclosure	98RM038
	Salix geyeriana/Mesic Forb	Charity Spring Exclosure	98RM041
		Dean Site Exclosure	98RM073
	Salix geyeriana/Mesic graminoid	Owyhee Plateau Vegetation Mapping	obs. form
	Salix geyeriana-Salix boothii/Rosa woodsii (T)	Owyhee Plateau Vegetation Mapping	obs. form
Salix lasiandra	*Salix lasiandra*/Bench	Syrup Creek Exclosure	98RM005*a*
		Dry Creek Spring Exclosure	98RM003
	Salix lasiandra/Cornus sericea	Dead Dog Creek	98RM030
		Pleasant Valley Table	97RM044
		Syrup Creek Exclosure	98RM062
	Salix lasiandra/Mesic forb (T)	Western Snake River Wetland Inventories	obs. form
Salix lasiolepis	*Salix lasiolepis* d.t.	Syrup Creek Exclosure	98RM060
		Jump Creek	97RM014
		Rocking M	TRAI02A TRAI06A WOLF03A WOLF05A WOLF06A
	Salix lasiolepis/Barren	Rocking M	ROCK01C
		Dead Dog Creek	98RM031
		Teapot Basin Spring Exclosure	98RM001
		Ryegrass Spring Exclosure	98RM002
		Cat Spring Exclosure	98RM043
		Hixon Sharp-tailed Grouse Area	97RM034 97RM032
		Little Jacks Creek	97RM016
Salix lemmonii	*Salix lemmonii*/Bench	Current Creek	99RM009 99RM010

Salix lutea	*Salix lutea/Poa pratensis* c.t.	Black Leg Box Canyon	98RM063
	Salix lutea/Rosa woodsii	Flat Creek	98CM007
		Stewart Gulch	97RM005
		Rocking M	DENN03A
	Salix lutea/Bench (T)	Western Snake River Wetland Inventories	obs. form
	Salix lutea/Barren (T)	Western Snake River Wetland Inventories	obs. form
Low Shrub			
Artemisia (arbuscula, longiloba)	*Artemisia (arbuscula, longiloba)* ephemeral drainage (T)	Owyhee Plateau Vegetation Mappiing	obs. form
		Owyhee Tableland Vernal Lakes	obs. form
		Big Springs Butte Basin	obs. form
		45 Ranch	obs. form
Artemisia cana	*Artemisia cana*/Dry graminoid	Pleasant Valley Table	97RM043
		45 Ranch	98RM049 98RM054 98RM080
		Big Springs Butte Basin	9907261200
		Turner Table	99RM002 99RM003
		Owyhee Tableland Vernal Lakes	obs. form
		Lost Valley	obs. form
	Artemisia cana/Festuca idahoensis	Kerr Exclosure	98RM034
		Lost Valley	9908040940
		Big Springs Butte Basin	obs. form
	Artemisia cana/Muhlenbergia richardsonis	45 Ranch	98MM001 98RM007 98CM010 98RM053 obs. form
		YP Lake Bed	97RM026
		Turner Table	99RM003 99RM005
		Owyhee Tableland Vernal Lakes	99RM008
	Artemisia cana/Mesic graminoid (T)	Owyhee Plateau Vegetation Mapping	obs. form
		Turner Table	obs. form
Artemisia papposa	*Artemisia papposa*	45 Ranch	98RM051 98RM079
		Lost Valley	9908041146
		Pleasant Valley Table	97RM041
		Big Springs Butte Basin	obs. form

Artemisia tridentata ssp. *tridentata*	*Artemisia tridentata* ssp. *tridentata/Elymus cinereus*	45 Ranch	OF5 98RM009 98RM015 98RM021 98CM001
		Black Leg Box Canyon	98RM066
	Unclassified *Artemisia tridentata* ssp. *tridentata* associations	Owyhee Plateau Vegatation Mapping	obs. form
Sarcobatus vermiculatus	*Sarcobatus vermiculatus/Distichlis spicata*	Snake River Birds of Prey (TNC Tract)	97RM020
	Sarcobatus vermiculatus/Elymus cinereus	Western Snake River Wetland Inventories	obs. form
	Sarcobatus vermiculatus/Poa secunda (T)	45 Ranch	98RM022
Graminoid			
Agropyron smitthii	*Agropyron smithii*	Western Snake River Wetland Inventories	obs. form
Alopecurus sp.	*Alopecurus* sp. vernal pool (T)	Owyhee Plateau Vegetation Mapping	obs. form
Carex douglasii	*Carex douglasii* (T)	Western Snake River Wetland Inventories	obs. form
Carex lanuginosa	*Carex lanuginosa*	Western Snake River Wetland Inventories	obs. form
Carex nebrascensis	*Carex nebrascensis*	Kerr Exclosure	98RM063
		Dean Site Exclosure	obs. form
		45 Ranch	98RM056 98MM004
		Manada Flat	obs. form
Carex praegracilis	*Carex praegracilis*	Western Snake River Wetland Inventories	obs. form
Carex sheldonii	*Carex sheldonii* (T)	The Tules	97RM028
Carex simulata	*Carex simulata*	Kerr Exclosure	98RM037
Carex utriculata	*Carex utriculata*	Dean Site Exclosure	obs. form
		The Tules	obs. form
Carex vulpinoidea	*Carex vulpinoidea* (T)	Western Snake River Wetland Inventories	obs. form
Danthonia californica	*Danthonia californica*	Pleasant Valley Table	97RM042
		45 Ranch	98RM008 98RM050
		Manada Flat	00707-945
Distichlis spicata	*Distichlis spicata*	Western Snake River Wetland Inventories	obs. form
Eleocharis palustris	*Eleocharis palustris* lotic	Black Leg Box Canyon	98RM065
		45 Ranch	98RM048
	Eleocharis palustris vernal pool	YP Lake Bed	97RM025
		45 Ranch	98RM052 98MM002 obs. form
		Owyhee Tableland Vernal Lakes	99RM007
		Turner Table	99RM004
			99RM006
Eleocharis rostellata	*Eleocharis rostellata*	45 Ranch	98RM020

			98RM024 98RM082 98MM003 obs. form
Elymus cinereus	*Elymus cinereus–Distichlis spicata*	Owyhee Plateau Vegetation Sampling	obs. form
Elymus triticoides	*Elymus triticoides* (T)	Western Snake River Wetland Inventories	obs. form
Glyceria grandis	*Glyceria grandis*	Charity Spring Exclosure	98RM039
Hordeum brachyantherum	*Hordeum brachyantherum*	Charity Spring Exclosure	98RM042
Juncus balticus	*Juncus balticus*	Kerr Exclosure	98RM035
		45 Ranch	98RM046 98RM044 98RM057
Juncus effusus	*Juncus effusus*	Western Snake River Wetland Inventories	obs. form
Muhlenbergia richardsonis	*Muhlenbergia richardsonis*	Owyhee Plateau Vegetation Mapping	obs. form
Paspalum distichum	*Paspalum distichum* (T)	Western Snake River Wetland Inventories	obs. form
Phragmites australis	*Phragmites australis*	45 Ranch	98RM028 98RM081
Poa nevadensis	*Poa nevadensis* (T)	Big Springs Butte Basin	obs. form
		Owyhee Plateau Vegetation Mapping	obs. form
Poa (palustris, pratensis)	*Poa (palustris, pratensis)* c.t.	Owyhee Plateau Vegetation Mapping	obs. form
Scirpus acutus	*Scirpus (acutus, validus)*	Snake River Birds of Prey (TNC Tract)	obs. form
		The Tules	obs. form
Scirpus americanus	*Scirpus americanus*	45 Ranch	98RM023
Scirpus microcarpus	*Scirpus microcarpus*	Western Snake River Wetland Inventories	obs. form
Scirpus pallidus	*Scirpus pallidus* (T)	Hixon Sharp-tailed Grouse Area	97RM033
Scirpus pungens	*Scirpus pungens*	45 Ranch	97RM023 98RM012 98RM016
Sporobolus airoides	*Sporobolus airoides*`	Western Snake River Wetland Inventories	obs. form
Unclassified Vernal Pool	Unclassified Vernal Pool Associations	Western Snake River Wetland Inventories	obs. form
		Owyhee Plateau Vegetation Mapping	obs. form
Forb			
Artemisia ludoviciana	*Artemisia ludoviciana*	45 Ranch	97RM022 98RM058 98RM047
		Current Creek	99RM012
Berula erecta	*Berula erecta* (T)	45 Ranch	98RM045

			98RM055
Camassia cusickii	*Camassia cusickii* seep	Summer Creek	0F13
Lepidium davisii	*Lepidium davisii* vernal pool	45 Ranch	97RM024 98RM006
Mimulus guttatus	*Mimulus guttatus* (T)	Dean Site Exclosure	98CM008
Polygonum amphibium	*Polygonum (amphibium, coccineum)*	Western Snake River Wetland Inventories	obs. form
Typha latifolia	*Typha (latifolia, angustifolia)*	Western Snake River Wetland Inventories	obs. form

KEY TO PLANT ASSOCIATIONS, COMMUNITY TYPES, AND DOMINANCE TYPES

A key to the plant associations, community types, and dominance types documented from the study area follows. Because of the poor documentation of riparian and wetland community types in southwestern Idaho, the key was written for the condition of the types as they were documented at the study sites. However, the key probably has broader use for vegetation in similar ecological settings throughout the region. Descriptions of the types appear later in this section, either as Community Characterization Abstracts (for confident and well-sampled types) or as short descriptions (for tentative, under-sampled, or anecdotal types).

Instructions for use of the key:

1. Locate a sample plot that represents the stand as a whole. Avoid ecotones between communities and microsites that represent small-scale disturbances. Recommended minimum plot size is 100 m^2.

2. While in the plot identify the type by following the key. In sites that have been heavily impacted by anthropogenic factors (such as grazing), search for remnants of native vegetation. The cover values in the key may be reduced for some disturbed sites.

3. Record canopy cover for all species in the plot. Validate the key by comparing plot data with written descriptions and stand tables (if available) to check for the presence of constant and characteristic species.

Key to major hydrologic groups

1. Sampled stand is in, or adjacent to, permanent water source (includes both perennial streams and annually flowing but seasonally intermittent streams), or has saturated or subirrigated soils throughout the growing season (e.g., mesic graminoid or forb dominated meadows and perennial seeps or springs). Includes stands occupying ephemerally moist (may be seasonally flooded) terraces, basins, flats, or seeps with alkaline soil, or ephemerally moist xero-riparian settings (that rarely flood but are influenced by groundwater) such as high, well-drained alluvial terraces or benches, basins, or toe-slopes with non-alkaline soil.

Permanent water source riparian and wetland types

1. Sampled stand is in an internally drained basin (e.g., a vernal pool), vernally wet meadow or seep (soil dries completely by mid-summer), or a stream drainage that has surface water only during brief periods in the winter and spring (though not every year), or occasionally during flash floods.

Ephemeral riparian and wetland types

Permanent water source riparian and wetland types

Key to dominance groups

1. Conifers dominate the overstory, or are co-dominant with *Populus* spp., *Alnus rhombifolia*, *Salix* spp., or other shrubs and are reproducing.
Needle-leaved evergreen forest and woodland types

1. Not as above. 2

2. *Populus spp., Salix amygdaloides,* or *Alnus rhombifolia* present with at least 15% cover and not representing a sere to conifer or shrub dominated types.
Broad-leaved deciduous forest types

2. Trees absent, or if present, with less than 15% total cover or restricted to microsites. 3

3. Shrubs present with at least 10% total cover. ***Scrub-shrub types***

3. Not as above. Shrubs and trees contributing minor amounts to composition or restricted to microsites. Herbaceous species with a combined cover of at least 15%. ***Herbaceous types***

Key to needle-leaved evergreen forest and woodland types

1. *Pseudotsuga menziesii* dominates the overstory, or is present and reproducing with at least 30% cover. 2

1. Not as above. *Juniperus scopulorum* may be dominant. 4

2. *Cornus sericea* with at least 25% cover. ***Pseudotsuga menziesii/Cornus sericea***

2. Not as above. 3

3. *Acer glabrum* with at least 15% cover and other indicator shrubs, including *Philadelphus lewisii*, *Physocarpus malvaceus*, and *Symphoricarpos albus*, are present.
***Pseudotsuga menziesii/Acer glabrum-Physocarpus malvaceus* Floodplain**

3. Not as above. **Unclassified or other *Pseudotsuga menziesii* dominated associations**

4. *Juniperus scopulorum* dominates the overstory and *Elymus glaucus* dominates the herbaceous understory and total shrub cover is less than 10%.
***Juniperus scopulorum/Elymus glaucus* (T)**

4. Not as above. 5

5. *Juniperus scopulorum* dominates the overstory and *Equisetum* spp. (e.g., *Equisetum arvense* and/or *E. hyemale*) dominate the herbaceous understory and total shrub cover is less than 10%.
***Juniperus scopulorum/Equisetum* (*arvense, hyemale*) (T)**

5. Not as above (see also ephemeral riparian and wetland types key for *Juniperus occidentalis*).
Unclassified or other needle-leaved evergreen forest and woodland types

Key to broad-leaved deciduous forest types

1. *Populus tremuloides* dominates the overstory with at least 30% cover. 2

1. Not as above. 4

   2. *Cornus sericea* with at least 15% cover. ***Populus tremuloides/Cornus sericea***

   2. Not as above. 3

3. *Cornus sericea* absent (or less than 15% cover) and a mixture of other shrubs (e.g., *Acer glabrum*, *Philadelphus lewisii*, *Prunus virginiana*, *Symphoricarpos albus*), dominate the understory.
   Unclassified *Populus tremuloides*/Tall shrub associations

3. Not as above. **Unclassified or other *Populus tremuloides* dominated associations**

   4. *Populus trichocarpa* dominates the overstory (including early seral communities on recently deposited alluvial bars where it is abundantly reproducing). 5

   4. Not as above. 13

5. *Salix lasiandra* with at least 20% cover. ***Populus trichocarpa/Salix lasiandra***

5. Not as above. 6

   6. *Salix lutea* with at least 20% cover. ***Populus trichocarpa/Salix lutea***

   6. Not as above. 7

7. *Acer glabrum* with at least 25% cover or the dominant shrub.***Populus trichocarpa/Acer glabrum***

7. Not as above 8

   8. *Crataegus douglasii* dominates the shrub understory.
   Populus trichocarpa/Crataegus douglasii

   8. Not as above. 9

9. *Symphoricarpos albus* dominates the shrub understory with at least 20% cover.
   Populus trichocarpa/Symphoricarpos albus

9. Not as above. 10

   10. *Rosa woodsii* dominates the shrub understory with at least 15% cover.
   Populus trichocarpa/Rosa woodsii

   10. Not as above. 11

11. Early seral communities on recently deposited alluvial bars dominated by abundantly reproducing *Populus trichocarpa* and having a sparse herbaceous understory due to annual flood scouring.
   ***Populus trichocarpa*/Barren**

11. Not as above. 12

   12. Understory dominated by native species.

Unclassified or other *Populus trichocarpa* dominated associations

12. Understory dominated by exotic species.
***Populus trichocarpa/Poa pratensis* c.t. or other disturbance induced *P. trichocarpa* communities**

13. *Salix amygdaloides* dominates the overstory with at least 20% cover.
***Salix amygdaloides* dominance type**

13. Not as above. 14

14. *Alnus rhombifolia* dominates the overstory and *Philadelphus lewisii* dominates the understory.
Alnus rhombifolia/Philadelphus lewisii

14. Not as above. **Unclassified or other broad-leaved deciduous forest types**

Key to scrub-shrub types

1. *Salix* spp. with at least 20% total cover and/or the dominant shrub group present.
Salix spp. types

1. *Salix* spp. absent, or with less than 20% cover, or stands clearly dominated by other shrubs.
Other scrub-shrub types

Key to Salix spp. types

1. *Salix geyeriana* is the dominant *Salix* spp. with at least 20% cover, though *Salix boothii* may be co-dominant (with at most 20% cover), other *Salix* spp. are commonly present in lesser amounts. 2

1. Not as above. 6

2. *Carex utriculata* clearly dominates the herbaceous understory.
Salix geyeriana/Carex utriculata

2. Not as above. 3

3. A mixture of mesic graminoid species (e.g.,*Carex lanuginosa*, *Carex microptera, Deschampsia cespitosa*, and *Poa pratensis*) dominates the understory with at least 25% total cover (or total cover greater than that of mesic forbs). ***Salix geyeriana*/Mesic graminoid**

3. Not as above. 4

4. A mixture of mesic forb species (e.g., *Aconitum columbianum*, *Epilobium ciliatum*, *Geum macrophyllum*, *Mimulus guttatus*, and *Senecio pseudareus*) dominates the understory with at least 25% total cover (or total cover greater than that of mesic graminoids).
***Salix geyeriana*/Mesic forb**

4. Not as above. 5

5. *Salix boothii* co-dominant with *Salix geyeriana* and *Rosa woodsii* present with at least 20% cover.
***Salix geyeriana-Salix boothii/Rosa woodsii* (T)**

5. Not as above. **Unclassified or other *Salix geyeriana* dominated associations**

6. *Salix lasiandra* is the dominant *Salix* spp., with at least 25% cover, alone or in combination with other shrubs. 7

6. Not as above. 10

7. A mixture of mesic forb species (e.g., *Aster ascendens*, *Equisetum* spp., *Euthamia occidentalis*, and *Solidago gigantea*) dominates the understory with greater total cover than that of mesic graminoids. ***Salix lasiandra*/Mesic forb (T)**

7. Not as above. 8

8. *Cornus sericea* always present and usually dominant in the understory, though other shrubs are present and occasionally co-dominant. ***Salix lasiandra*/*Cornus sericea***

8. Not as above. 9

9. Type occupying alluvial bars and terraces with a mixture of shrubs (e.g., mainly *Rosa woodsii* and *Prunus virginiana*, and *Cornus sericea* absent or present in trace amounts) and a relatively sparse herbaceous understory. ***Salix lasiandra*/Bench**

9. Not as above. **Unclassified or other *Salix lasiandra* dominated associations**

10. *Salix lutea* is the dominant *Salix* spp. with at least 25% cover, alone or in combination with other shrubs. 11

10. Not as above. 14

11. *Salix lutea* is the dominant shrub with at least 25% cover, typically in combination with other shrubs of lesser cover (including *Alnus incana*, *Betula occidentalis*, *Ribes aureum*, *Rosa woodsii*, and other *Salix* spp.) and with a lush, but heterogeneous herbaceous layer. Type often found on alluvial bars, islands, and terraces perched above high water line. ***Salix lutea*/Bench**

11. Not as above. 12

12. *Rosa woodsii* may be the dominant understory shrub, but equal amounts of *Betula occidentalis*, *Philadelphus lewisii*, *Ribes aureum*, *Rubus idaeus*, and *Toxicodendron rydbergii* are often intermixed. The herbaceous understory is relatively sparse.
Salix lutea/Rosa woodsii

12. Not as above. 13

13. *Salix lutea* is the dominant *Salix* spp. on recently deposited alluvial bars (though other *Salix* spp. are often intermixed in lesser amounts) with a relatively sparse herbaceous understory due to annual flood scouring. ***Salix lutea*/Barren (T)**

13. Not as above. **Unclassified or other *Salix lutea* dominated association**

14. *Salix lemmonii* is the dominant *Salix* spp. (with at least 25% cover), often in combination with other shrubs of lesser amounts, with a heterogeneous but relatively sparse herbaceous understory. Often occupying drier riparian sites. ***Salix lemmonii*/Bench**

14. Not as above. 15

15. *Salix lasiolepis* is the dominant *Salix* spp. with at least 10% cover, often in combination with other shrubs (e.g., *Artemisia tridentata* ssp. *tridentata*, *Philadelphus lewisii*, and other *Salix* spp.). The herbaceous understory is heterogeneous (often weedy), though *Elymus glaucus* and *Equisetum arvense* are often conspicuous. ***Salix lasiolepis* dominance type**

15. Not as above. 16

16. *Salix lasiolepis* is the dominant shrub spp. with at least 40% cover over a sparse herbaceous understory. ***Salix lasiolepis*/Barren**

16. Not as above. 17

17. *Salix exigua* has greater cover than any other *Salix* species. 18

17. Not as above. 22

18. A mixture of mesic graminoid species (e.g., *Agrostis stolonifera*, *Carex lanuginosa*, *Eleocharis palustris*, and *Scirpus pungens*) dominates the understory with at least 25% total cover (or total cover greater than that of mesic forbs). ***Salix exigua*/Mesic graminoid**

18. Not as above. 19

19. A mixture of mesic forb species (e.g., *Euthamia occidentalis*, *Lycopus asper*, and *Verbena hastata*) dominates the understory with greater total cover than that of mesic graminoids. ***Salix exigua*/Mesic forb (T)**

19. Not as above. 20

20. *Rosa woodsii* dominates the understory with at least 25% cover (*Ribes aureum* often present). ***Salix exigua/Rosa woodsii* (T)**

20. Not as above. 21

21. Understory poorly developed or barren due to annual flood scouring. *Salix exigua* colonizing recently deposited alluvial bar. ***Salix exigua*/Barren**

21. Not as above. 22

22. Understory dominated by native species. **Unclassified or other *Salix* spp. dominated associations**

22. Understory dominated by exotic species. **Disturbance induced *Salix* spp. dominated communities (e.g., *Salix lutea/Poa pratensis* c.t., *Salix exigua/Poa pratensis*, etc.)**

Key to other scrub-shrub types

1. *Betula occidentalis* the dominant shrub with at least 15% cover. 2

1. Not as above. 5

2. Mesic forbs species (e.g., *Osmorhiza chilensis*, *Smilacina stellata* (the most constant), and *Urtica dioica*) with at least 25% total cover. No shrub other than *Toxicodendron rydbergii* is present with greater than 10% cover. ***Betula occidentalis*/Mesic forb**

2. Not as above. 3

3. *Cornus sericea* present with at least 20% cover. ***Betula occidentalis/Cornus sericea***

3. Not as above. 4

4. *Philadelphus lewisii* and *Toxicodendron rydbergii* alone or in combination with at least 20% cover. ***Betula occidentalis/Philadelphus lewis***

4. Not as above. 5

5. *Cornus sericea* is the dominant shrub with at least 25% cover. Understory often sparse due to shading, annual flood scouring, or absence of soil development. ***Cornus sericea***

5. Not as above. 6

6. *Crataegus douglasii* is the dominant tall shrub with at least 10% cover and *Rosa woodsii* dominates the understory shrub layer (though other shrubs may be co-dominant). ***Crataegus douglasii/Rosa woodsii***

6. Not as above. 7

7. *Prunus virginiana* is the dominant shrub with at least 30% cover. 8

7. Not as above. 9

8. *Elymus glaucus* always present with greater than trace cover. Total understory graminoid cover is greater than total forb cover. ***Prunus virginianalElymus glaucus***

8. *Elymus glaucus* usually absent (or minor) and shrubs (e.g., *Rosa woodsii* and *Salix lutea*) alone or in combination with at least 20% cover. Total understory forb cover is greater than total graminoid cover. ***Prunus virginiana* dominance type**

9. *Philadelphus lewisii* is the dominant shrub with at least 50% cover, though other shrubs may be co-dominant. ***Philadelphus lewisii***

9. Not as above. 10

10. *Ribes aureum* is the dominant shrub with at least 20% cover. *Rosa woodsii* often present. ***Ribes aureum* (T)**

10. Not as above. 11

11. *Prunus emarginata* is the dominant shrub with at least 50% cover. *Philadelphus lewisii* and/or *Rosa woodsii* may be sub-dominant. ***Prunus emarginata* (T)**

11. Not as above. 12

12. *Rhus trilobata* is clearly the dominant shrub (usually with high cover), though other shrubs (e.g., *Ribes aureum*, *Salix* spp., and *Toxicodendron rydbergii*) are often present. The herbaceous understory is sparse. ***Rhus trilobata***

12. Not as above. 13

13. Scrub-shrub types occupying ephemerally moist (may be seasonally flooded) terraces, basins, flats, or seeps with alkaline soil, or ephemerally moist xero-riparian settings (that rarely flood) such as high, well-drained alluvial terraces, basins, or toe-slopes with non-alkaline soil. 14

13. Not as above. 20

14. *Sarcobatus vermiculatus* is the dominant shrub with at least 20% cover. 15

14. Not as above. 17

15. *Distichlis strichta* forms a thick understory sward (clearly the dominant graminoid, usually with at least 40% cover). Typically on alkaline soil. ***Sarcobatus vermiculatus/Distichlis spicata***

15. Not as above. 16

16. *Elymus cinereus* is the dominant graminoid, roughly equal in cover with *Sarcobatus vermiculatus*. Soil is usually mildly alkaline. ***Sarcobatus vermiculatus/Elymus cinereus***

16. Not as above. 17

17. *Poa secunda*, alone or in combination with *Bromus tectorum*, the dominant understory species. Found on well-drained alluvial terraces without noticeably alkaline soil.
***Sarcobatus vermiculatus/Poa secunda* (T)**

17. Not as above. 18

18. *Artemisia tridentata* ssp. *tridentata* is the dominant shrub with at least 10% cover (though *Sarcobatus vermiculatus* is occasionally co-dominant). 19

18. Not as above. 20

19. *Elymus cinereus* is the dominant graminoid, though *Bromus tectorum* may replace it in highly disturbed stands. Often found on well-drained alluvial terraces without alkaline soils.
Artemisia tridentata* ssp. *tridentata/Elymus cinereus

19. Not as above. 20
Unclassified or other *Sarcobatus vermiculatus* dominated (expected on alkaline soils) or *Artemisia tridentata* ssp. *tridentata* dominated associations (e.g., *Artemisia tridentata* ssp. *tridentata* with *Bromus tectorum*, *Carex douglasii*, *Juncus balticus*, or *Poa secunda* dominated understories)

20. Understory dominated by native species.
Unclassified or other scrub-shrub dominated associations (e.g., *Alnus incana*, *Amelanchier alnifolia*, *Celtis reticulata*, *Rhus glabra*, and *Rosa woodsii* types)

20. Overstory or understory dominated by exotic species.
Disturbance induced scrub-shrub dominated communities (e.g., *Amorpha fruticosa*, *Betula occidentalis/Poa pratensis* c.t., and *Prunus cerasifera*)

Key to herbaceous types

1. Mesic or dry graminoid species dominate with at least 25% total cover, or form the dominant suite of species with higher total cover than that of mesic forbs. **Graminoid types**

1. Mesic forb species dominate with at least 25% total cover, or form the dominant suite of species with higher total cover than that of mesic or dry graminoids. **Forb types**

Key to graminoid types

1. Graminoid types occupying ephemerally moist (may be seasonally flooded) terraces, basins, flats, or seeps with alkaline soil, or ephemerally moist xero-riparian settings (that rarely flood)

such as high, well-drained alluvial terraces, basins, or toe-slopes with non-alkaline soil. *Eleocharis* spp. and *Scirpus* spp. not sought here. 23

1. Not as above. Types dominated by mesic graminoid species on non-alkaline sites (though *Eleocharis spp.* and *Scirpus* spp. may sometimes occur on saturated alkaline soils) with moist or saturated soil throughout the growing season. 2

   2. *Scirpus* spp. clearly dominate, usually with at least 25% total cover. 3

   2. Not as above. 8

3. *Scirpus acutus* (or *Scirpus validus*) with at least 25% cover, or clearly the dominant species, often forming dense stands. *Typha latifolia* can be sub-dominant.
   ***Scirpus acutus* (or *Scirpus validus*)**

3. Not as above. 4

   4. *Scirpus pungens* with at least 25% cover, or clearly the dominant species. *Carex lanuginosa* and *Eleocharis palustris* may have 20% or more cover each but are not dominant.
      Scirpus pungens

   4. Not as above. 5

5. *Scirpus americanus* with at least 25% cover, or clearly the dominant species, often forming dense stands. ***Scirpus americanus***

5. Not as above. 6

   6. *Scirpus pallidus* with at least 25% cover, or clearly the dominant species.
      ***Scirpus pallidus* (T)**

   6. Not as above. 7

7. *Scirpus microcarpus* with at least 25% cover, or the dominant species. *Carex lanuginosa*, *Eleocharis palustris*, and/or *Scirpus americanus* may have 20% or more cover each but are not dominant. ***Scirpus microcarpus***

7. Not as above. **Unclassified or other *Scirpus* spp. dominated associations**

   8. *Eleocharis palustris* with at least 25% cover (typically greater than 50%), or clearly the dominant species, found in (or adjacent to) perennial water sources (e.g., springs, seasonal streams, ckwater sloughs, lakes, perennial streams, and rivers). *Carex lanuginosa* may occasionally be co-dominant. ***Eleocharis palustris* lotic**

   8. Not as above. 9

9. *Eleocharis rostellata* with at least 25% cover, or clearly the dominant species, often forming dense swards. Sometimes on alkaline soils. ***Eleocharis rostellata***

9. Not as above. 10

   10. *Carex* spp. clearly dominate with at least 25% cover. Sites are mesic with non-alkaline soils, rather than ephemerally moist and often alkaline (see also lead 23). 11

   10. Not as above. 17

11. *Carex utriculata* with at least 25% cover, or clearly the dominant species, often forming dense swards. ***Carex utriculata***

11. Not as above. 12

12. *Carex vulpinoidea* with at least 25% cover, or clearly the dominant species. ***Carex vulpinoidea* (T)**

12. Not as above. 13

13. *Carex simulata* with at least 25% cover, or clearly the dominant species, often forming dense swards. ***Carex simulata***

13. Not as above. 14

14. *Carex sheldonii* with at least 25% cover, or clearly the dominant species, often forming dense swards. ***Carex sheldonii* (T)**

14. Not as above. 15

15. *Carex nebrascensis* with at least 25% cover, or clearly the dominant species. *Muhlenbergia richardsonis* may have up to 30% cover but is not dominant. ***Carex nebrascensis***

15. Not as above. 16

16. *Carex lanuginosa* with at least 25% cover and is clearly the dominant species. *Carex lanuginosa*

16. Not as above. **Unclassified or other *Carex* spp. dominated associations**

17. *Juncus effusus* with at least 25% cover, or clearly the dominant species. *Carex vulpinoidea* may have up to 20% cover. ***Juncus effusus***

17. Not as above. 18

18. *Juncus balticus* with at least 25% cover and is clearly the dominant species. *Carex nebrascensis* and *Muhlenbergia richardsonis* may have 20% or more cover each but are not dominant. ***Juncus balticus***

18. Not as above. 19

19. *Glyceria grandis* with at least 25% cover, or clearly the dominant species. ***Glyceria grandis***

19. Not as above. 20

20. *Paspalum distichum* with at least 25% cover, or clearly the dominant species. *Xanthium strumarium* may be co-dominant. ***Paspalum distichum* (T)**

20. Not as above. 21

21. *Hordeum brachyantherum* with at least 25% cover, or clearly the dominant species. ***Hordeum brachyantherum***

21. Not as above. 22

22. *Phragmites australis* with at least 25% cover, or clearly the dominant species, often forming dense stands on both alkaline and non-alkaline sites (see also lead 26). ***Phragmites australis***

22. Not as above. 31

23. *Distichlis spicata* with at least 25% cover, or clearly the dominant species. *Carex praegracilis*, *Elymus cinereus*, *Sporobolus airoides*, and other grasses are absent or present in only minimal amounts. Typically forms dense swards on alkaline soil. ***Distichlis spicata***

23. Not as above. 24

24. *Carex praegracilis* with at least 25% cover, or clearly the dominant species. Soil may or may not be mildly alkaline. Often forms dense swards. ***Carex praegracilis***

24. Not as above. 25

25. *Elymus cinereus* clearly dominates (often with at least 25% cover) over a sward of *Distichlis strichta* (usually with at least 25% cover). Soil may or may not be mildly alkaline. Other grasses are present in only minimal amounts. ***Elymus cinereus-Distichlis strichta***

25. Not as above. 26

26. *Phragmites australis* with at least 25% cover, or clearly the dominant species (see also lead 22). ***Phragmites australis***

26. Not as above. 27

27. *Elymus triticoides* dominates with at least 25% cover, or is clearly dominant with higher cover than that of *Agropyron smithii*. Soils may or may not be mildly alkaline. Often forms dense swards. ***Elymus triticoides***

27. Not as above. 28

28. *Agropyron smithii* dominates with at least 25% cover, or is clearly dominant with higher cover than that of *Elymus triticoides*. Soils may or may not be mildly alkaline. Sometimes forms dense swards. ***Agropyron smithii***

28. Not as above. 29

29. *Carex douglasii* dominates with at least 25% cover. Soil is usually non-alkaline and sandy (e.g., well-drained alluvial terraces). Sometimes forms dense swards. ***Carex douglasii*** (T)

29. Not as above. 30

30. *Sporobolus airoides* clearly dominates (usually with at least 15% cover), though other graminoid species such as *Agropyron smithii*, *Carex praegracilis*, *Distichlis strichta*, or *Elymus triticoides*, are often present in lesser amounts. Soils are often mildly alkaline. ***Sporobolus airoides***

30. Not as above. 31

31. Dominated by native graminoid species (try also ephemeral riparian and wetland types key (e.g., for *Danthonia californica*, *Muhlenbergia richardsonis*, *Poa nevadensis*, and vernal pools)).

Unclassified or other graminoid spp. dominated associations (e.g., *Agrostis exarata, Agrostis scabra*, *Alopecurus aequalis*, *Carex* spp., *Deschampsia cespitosa*, *Glyceria* spp., *Juncus* spp., *Puccinellia pauciflora*, etc.)

31. Dominated by exotic graminoid species.
Poa pratensis, _Poa palustris_, and other disturbance induced graminoid types (e.g., _Agrostis stolonifera_, _Bromus inermis_, _Crypsis alopecuroides_, _Echinochloa crus-galli_, _Phalaris arundinacea_, _Phleum pratense_, etc.)

Key to forb types

1. *Typha latifolia* (or *Typha angustifolia*) with at least 25% cover, or clearly the dominant species. Often forms dense stands on sites flooded or saturated all year. *Scirpus acutus* may be sub-dominant. ***Typha latifolia* (*angustifolia*)**

1. Not as above.

    2. *Berula erecta* with at least 25% cover, or clearly the dominant species (typically forming dense stands in perennially flowing springs). ***Berula erecta* (T)**

    2. Not as above. 3

3. *Mimulus guttatus* with at least 25% cover, or clearly the dominant species (often found in perennial flowing springs and seeps). *Epilobium ciliatum* may be co-dominant. ***Mimulus guttatus* (T)**

3. Not as above. 4

    5. *Polygonum amphibium* (or *Polygonum coccineum*) with at least 25% cover, or clearly the dominant species. Typically forms dense stands on seasonally flooded sites. ***Polygonum amphibium* (*coccineum*)**

    4. Not as above. 5

5. *Camassia cusickii* with at least 25% cover, or clearly the dominant species. Typically found in seasonally wet seeps, some of which dry by mid-summer (see also ephemeral riparian and wetland types key). ***Camassia cusickii* seep**

5. Not as above. 6

    6. *Artemisia ludoviciana* with at least 10% cover and is clearly the dominant species. Typically found in both seasonally flowing intermittent waterways and ephemeral drainages (see also ephemeral riparian and wetland types key). ***Artemisia ludoviciana***

    6. Not as above. 7

7. Dominated by native forb species (try also ephemeral riparian and wetland types key).
Unclassified or other forb spp. dominated associations (e.g., aquatic associations, *Camassia quamash*, *Equisetum* spp., *Euthamia occidentalis*, *Iris missouriensis*, *Potentilla gracilis*, *Rorippa nasturtium-aquaticum*, *Solidago* spp., *Sparganium* spp., *Veratrum californicum*, *Veronica* spp., *Urtica dioica*, etc.)

7. Dominated by exotic forb species.
Disturbance induced forb spp. dominated communities (e.g., *Dipsacus sylvestris*, *Lythrum salicaria*, *Melilotus* spp., *Medicago* spp., *Mollugo verticillata*, *Polygonum* spp., etc.)

Ephemeral riparian and wetland types

1. *Artemisia cana* with at least 20% cover, or present and reproducing with lesser cover. 6

1. Not as above. 2

    2. Herbaceous species dominate (including *Artemisia ludoviciana*). Trees and shrubs absent, or with only trace cover and not reproducing. 10

    2. Woody species dominate and are usually reproducing on the site. 3

3. *Juniperus occidentalis* dominates ephemeral drainage overstory with at least 10% cover, or is present and reproducing, with *Artemisia arbuscula* and/or *Danthonia californica*, *Festuca idahoensis*, *Elymus glaucus*, *Poa nevadensis*, *Poa secunda*, and other herbaceous species commonly found in ephemerally moist sites in the understory. Occasionally found along perennial or seasonally intermittent streams also.
***Juniperus occidentalis* ephemeral drainage (T)**

3. Not as above. 4

    4. *Artemisia papposa* with at least 10% cover, or greater cover than that of other shrubs, forming an open overstory over *Haplopappus stenophyllus*, *Poa secunda*, and *Sitanion hystrix*. Typically found in ephemeral drainages but also occasionally on margins of vernal pools.
Artemisia papposa

    4. Not as above. 5

5. *Artemisia arbuscula* (or *Artemisia longiloba*) dominates ephemeral drainage with at least 10% cover, or greater cover than that of other shrubs, over *Danthonia californica*, *Festuca idahoensis*, *Poa nevadensis, Poa secunda*, and other herbaceous species commonly found in ephemerally moist sites. Occasionally on margins of vernal pools.
***Artemisia arbuscula* (or *Artemisia longiloba*) ephemeral drainage (T)**

5. Not as above.
Unclassified or other tree or shrub spp. dominated ephemeral riparian or wetland type

    6. Understory dominated by a heterogeneous mix of mesic graminoid species (e.g., *Danthonia californica*, *Deschampsia danthonioides*, *Eleocharis palustris*, *Hordeum brachyantherum*, and *Juncus* spp.) with at least 25% combined total cover. *Muhlenbergia richardsonis* is present in only trace amounts. Often found on margins of vernal pools or lakes.
***Artemisia cana*/Mesic graminoid (T)**

    6. Not as above. 7

7. *Muhlenbergia richardsonis* dominates the sparse ground layer (usually with at least 25% cover), though *Eleocharis palustris* may be co-dominant. Typically found on margins of vernal pools or vernal lakes, but occasionally in ephemeral drainages.
Artemisia cana*/*Muhlenbergia richardsonis

7. Not as above. 8

8. *Festuca idahoensis* usually with at least 25% cover, or clearly the dominant graminoid, though *Carex douglasii* may be co-dominant. *Juncus balticus* and *Muhlenbergia richardsonis* may be present in low amounts. ***Artemisia cana/Festuca idahoensis***

8. Not as above. 9

9. Understory dominated by a heterogeneous mix of dry graminoids (e.g., *Carex douglasii, Poa nevadensis*, *Sitanion hystrix*, etc.) with at least 25% combined total cover. *Festuca idahoensis* may be present with trace cover but is never dominant.
***Artemisia cana*/Dry graminoid**

9. Not as above. **Unclassified or other *Artemisia cana* dominated association**

10. *Artemisia ludoviciana* with at least 10% cover and is clearly the dominant species. Typically found in both seasonally flowing intermittent waterways and ephemeral drainages (see also permanent water source riparian and wetland types key).
Artemisia ludoviciana

10. Not as above. 11

11. *Eleocharis palustris* with at least 25% cover, or is clearly the dominant species. Found in vernal pools, lakes, or reservoirs, often forming nearly pure stands.
***Eleocharis palustris* vernal pool**

11. Not as above. 12

12. *Muhlenbergia richardsonis* with at least 15% cover and clearly dominant. Found in ephemeral drainages or on margins of vernal pools. ***Muhlenbergia richardsonis***

12. Not as above. 13

13. *Danthonia californica* with at least 25% cover, or clearly the dominant species. *Festuca idahoensis* may or may not be present. Occupies ephemeral drainages, vernally wet basins, or ephemerally moist meadows. ***Danthonia californica***

13. Not as above. 14

14. *Lepidium davisii* is clearly the dominant species on vernally wet playas within *Artemisia tridentata* ssp. *wyomingensis*-steppe. Playas are often sparsely vegetated.
***Lepidium davisii* vernal pool**

14. Not as above. 15

15. Vernal pool dominated by annual graminoid spp. (e.g., *Alopecurus carolinianus*, *Cyperus* spp., *Deschampsia danthonioides*, *Eleocharis* spp., *Eragrostis* spp., etc.) and/or forb species common to vernally wet areas (e.g., *Camissonia tanacetifolia*, *Eryngium alismifolium*, *Downingia* spp., *Marsilea vestita*, *Myosurus* spp., *Navarretia intertexta*, *Plagiobothrys scouleri*, *Psilocarphus brevissimus*, *Veronica peregrina*, etc.).
Unclassified vernal pool association (e.g., *Alopecurus carolinianus, Deschampsia danthonioides*, mixed herbaceous, etc.)

15. Not as above. 16

16. *Camassia cusickii* with at least 25% cover, or clearly the dominant species. Typically found in seasonally wet seeps, some of which dry by mid-summer (see also Permanent water source riparian and wetland types ephemeral riparian and wetland types key).

16. Not as above.
    Unclassified or other ephemeral riparian and wetland association (see also permanent water source key e.g., *Distichlis spicata, Carex praegracilis, Phragmites australis)*

PLANT ASSOCIATION DESCRIPTIONS

The following section contains descriptions of all the plant associations that were encountered during this project. As noted previously there are some associations that have a high classification confidence due to sampling effort, knowledge of distribution, and/or description from surrounding regions. For each of these associations a Community Characterization Abstract (CCA) has been prepared. The abstracts are presented in the same order as Table 3 starting with forested associations, then progressing through woodland, tall shrub, low shrub, graminoid and forb associations. Short descriptions for the tentative associations and community types follow the complete CCAs.

FORESTED ASSOCIATIONS

Alnus rhombifolia/Philadelphus lewisii

White alder/Syringa **n=4**

RANGE

The association has been described from low elevations of west-central Idaho, on the Snake River and its tributaries. It is known form Washington, Adams and Idaho counties, Idaho (Miller 1976, Moseley 1998). Stands have also been reported in Oregon (Evans 1989). The main range for *Alnus rhombifolia* is California (Johnson 1995). It extends north to the interior foothills of the Coast Ranges and is at low to mid elevations in the Sierra Nevada. Further north it is known from the eastern slopes of the Cascades of Oregon and Washington into southern British Columbia. In Idaho the species is at its eastern limit on the Clearwater and Snake rivers (USDA 2000). Johnson (1995) also reports small stands of *Alnus rhombifolia* in the Owyhee Mountains of Idaho.

ENVIRONMENT

The *Alnus rhombifolia/Philadelphus lewisii* association is found in a mountainous region dissected by major river canyons and tributary streams. Topography is characterized by precipitous canyon walls along the rivers, steep upland slopes, and smaller tributary streams with cliffs, rocky slopes, and mass-wasting features such as slumps and mud-rock flows. The soils of the region are especially prone to erosion and slippage. Slopes often exceed the angle of repose and periodic severe thunderstorms with intense rains will super-saturate the soil mantle. The resulting slumping and mud-rock flows often deposit materials into stream channels and can destroy streambanks (Miller 1976).

SOILS

Detailed soil survey data is not available. Descriptions from stands indicate that deposits of boulder and rocks dominate the floodplain (Moseley 1998).

SPECIES	CON	COVER	MIN	MAX
TREES				
Alnus rhombifolia	100	85.6	60	100
Morus alba	20	6	0	30
Robinia pseudo-acacia	20	2	0	10
SHRUBS				
Clematis ligusticifolia	100	4.6	1	10
Cornus sericea	40	10	0	30
Crataegus douglasii	40	0.8	0	3
Philadelphus lewisii	100	10.6	3	20
Ribes aureum	40	0.4	0	1
Salix lasiolepis	40	4	0	10
Salix lutea	20	2	0	10
Toxicodendron rydbergii	20	4	0	20
FORBS				
Polygonum sp.	40	0.4	0	1
Lactuca serriola	40	0.4	0	1
FERNS/FERN ALLIES				
Equisetum hyemale	40	4.6	0	20
GRAMINOIDS				
Bromus tectorum	40	0.4	0	1
Elymus glaucus	100	1.8	1	3
Poa bulbosa	60	1	0	3

VEGETATION COMPOSITION

This forest association is dominated by broad-leaved, deciduous woody species. The tree *Alnus rhombifolia* dominates, with high cover. The shrub layer, also broad-leaved deciduous, is dominated by *Philadelphus lewisii*. Several other shrub species are commonly present, including *Crataegus douglasii, Cornus sericea, Prunus virginiana, Ribes oxyacanthoides*, and *Salix exigua*. Occasional colonies of the introduced shrub *Rubus discolor* can be found, as well as the native liana *Clematis ligusticifolia* and the introduced *Solanum dulcamara*. There is almost complete cover of *Alnus rhombifolia* in the overstory. The shrub canopy in the understory can be very sparse or reach as much as 50%. The herbaceous component of this association has low cover due to shade and hydrologic disturbance (Miller 1976). The native graminoid *Elymus glaucus*

was notably present in all Idaho stands (Moseley 1999).

ADJACENT COMMUNITIES

Adjacent upland communities are mostly canyon grasslands dominated by bluebunch wheatgrass and Idaho fescue. Occasionally at higher elevations, the Douglas fir/ninebark association borders this community. Other *Alnus rhombifolia* communities and several shrub dominated riparian communities may occur along the streams adjacent to this type.

MANAGEMENT CONSIDERATIONS

Alnus rhombifolia is rated as fair to useless browse for cattle, sheep, and horses. Livestock may use stands as loafing areas to escape the heat and browse on understory associates. The dominant overstory species has been used for revegetating disturbed riparian habitat. It has been planted to restore streams and to stabilize flood control channels. Since it requires a constant water supply, irrigation may be necessary to help transplants get established. *Alnus rhombifolia* is not fire resistant, though landscape position may allow stems to escape fire. Fires that expose mineral soils may provide seedbeds for establishment of *Alnus rhombifolia* (USDA 2000).

SUCCESSIONAL DYNAMICS

Alnus rhombifolia is a riparian pioneer species that produces copious amounts of wind and water transported seed. The seeds will colonize sites that are frequently disturbed by flooding and deposition of mud-rock flow materials. Seed establishment seems to be restricted to areas with continuously moist substrates (Miller 1976, USDA 2000). Plants will regenerate from both seeds and sprouts.

WILDLIFE FUNCTIONS

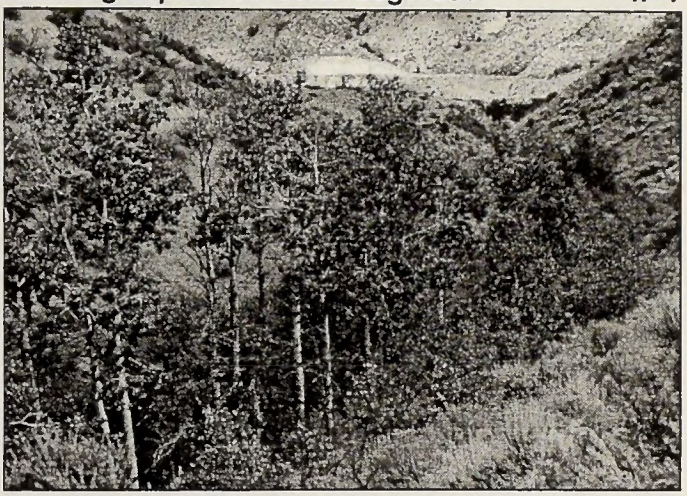
Wild ungulates will eat the bark, twigs, leaves, and buds of *Alnus rhombifolia*. Most consumption is likely in the fall, winter, and early spring. The bark of alder is used as food by beavers and stems are used for construction of lodges and dams. Seeds of alder are eaten by siskins, goldfinches, and other songbirds (USDA 2000).

CLASSIFICATION COMMENTS

This association was originally described by Miller (1976) in west central Idaho. Apparently, plot data was collected by Miller (1976) though stand tables are not available. The association is also reported in Oregon (Evans 1989). Seven stands with *Alnus rhombifolia* as the dominant overstory species were sampled in southwest Idaho (Moseley 1999). Two of the stands were tentatively classified as an *Alnus rhombifolia/Cornus sericea* association. *Philadelphus* was present in both of these stands and stands are considered part of the *Alnus rhombifolia/ Philadelphus lewisii* plant association.

Populus tremuloides/Cornus sericea

Quaking aspen/red-osier dogwood **n=1**



RANGE

The *Populus tremuloides/Cornus sericea* plant association is a major type known from eastern and southern Idaho, east-central Nevada, Montana, and the Okanogan Highlands of northeastern Washington (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997). It may also exist in eastern Oregon, being included with stands of *Populus tremuloides/Alnus incana-Cornus stolonifera* (Crowe and Clausnitzer 1997). In Idaho it is known from the Salmon River, Teton River, Henry's Fork, Silver Creek, Portneuf River, and Boise River drainages (Collins 1979, Jankovsky-Jones 1996, 1997a, 1997c, Jankovsky-Jones et al. 2000).

ENVIRONMENT

Populus tremuloides/Cornus sericea is found from low foothills and floodplains to high mountain valleys throughout its range. Elevations range from 2,200 ft to 6,900 ft. *Populus tremuloides/Cornus sericea* is typically found in narrow to broad U or V-shaped valleys, canyons, and floodplains that are seasonally flooded (Hansen et al. 1995, Hall and Hansen 1997). It is often along stable, low to moderate gradient streams (less than 3% to 8% slope) on alluvial terraces or canyon colluvium, but can also be near seeps and springs (Kovalchik 1993, Manning and Padgett 1995, Jankovsky-Jones 1996, Moseley 1998). The association is sometimes found away from streams but usually in moist areas (such as depressions or old channels). These areas typically have a water table near the surface in the spring which drops up to 2 m by late summer.

SOILS

Populus tremuloides/Cornus sericea is usually on Mollisol soils (Aquolls, Borolls, Haploxerolls) but also sometimes Entisols (shallow Fluvents, Aquic Xerofluvents) (Hansen et al. 1995, Manning and Padgett 1995). These Mollisols may have a surface muck layer derived from leaf litter and occasionally have enough organic matter to be Sapric Histisols (Kovalchik 1993, Hall and Hansen 1997). Soils are usually derived from coarse to fine alluvium (occasionally colluvium or ash) overlying river gravels and cobbles. Soil textures are sandy-skeletal, loamy-skeletal, fine-loamy, silty-loam, or organic loam which have low to high water holding capacity (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997).

VEGETATION COMPOSITION

Due to its broad geographical range, *Populus tremuloides/Cornus sericea* has variable vegetation. The dominant species are *Populus tremuloides* and *Cornus sericea*. In northern areas, sub-dominant trees include *Populus trichocarpa* and *Betula papyrifera* while conifers, such as *Picea engelmannii* or *Abies* spp., may be present elsewhere. Other tall shrubs, sometimes mixed with *Cornus sericea*, include *Salix* spp. (usually *Salix bebbiana*), *Betula occidentalis*, *Alnus incana, Prunus virginiana*, and *Crataegus douglasii*. *Rosa woodsii* (or other *Rosa* spp.) and *Symphoricarpos albus* typically dominate the low shrub understory. The herbaceous understory is dominated by forbs which vary from low to moderate cover depending on the density of *Cornus sericea*. The most common species, all with cover less than 15% but sometimes with high constancy, are *Equisetum* spp. (*Equisetum arvense* and *E. hyemale*), *Actaea rubra, Smilacina* spp., *Galium* spp., (*Galium triflorum* and *G. aparine*), and *Urtica dioica*. Other forbs which .are sometimes encountered include *Viola* spp., *Taraxacum officinale, Osmorhiza chilensis, Geum macrophyllum*, and *Thalictrum* spp. (Collins 1979, Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Jankovsky-Jones 1996, Hall and Hansen 1997, Jankovsky-Jones 1997a, 1997b, Moseley 1998). The graminoid layer has sparse cover, low diversity, and is dominated by exotic species. The common exotic grasses are *Bromus* spp. (usually *Bromus inermis* with up to 10% cover), *Agrostis stolonifera,* and *Poa pratensis*. Even less common are native graminoids including *Calamagrostis canadensis, Bromus*

ciliatus, Carex spp., and *Elymus glaucus*. The ground cover is predominantly litter (thickest where not flooded) with less than 5% cover of rocks (Kovalchik 1993, Manning and Padgett 1995, Moseley 1998).

SPECIES	CON	COVER	MIN	MAX
TREES				
Populus tremuloides	100	40	40	40
SHRUBS				
Cornus sericea	100	50	50	50
Crataegus douglasii	100	40	40	40
Salix lutea	100	3	3	3
FORBS				
Galium aparine	100	1	1	1
Osmorhiza chilensis	100	1	1	1
Urtica dioica	100	1	1	1
GRAMINOIDS				
Bromus brizaeformis	100	1	1	1
Bromus japonicus	100	1	1	1

ADJACENT COMMUNITIES

Adjacent associations with a similar moisture regime may include other *Populus tremuloides, Alnus incana, Salix* spp., or *Populus* spp. dominated types. The understories may be dominated by *Rosa woodsii, Salix lutea, Cornus sericea, Prunus virginiana*, and *Crataegus douglasii* in the understory (Jankovsky-Jones 1996, Manning and Padgett 1995, Hall and Hansen 1997). Wetter sites range from saturated stands of *Typha* spp., *Scirpus* spp., *Eleocharis palustris, Carex utriculata, or Phalaris arundinacea* to *Alnus incana, Cornus sericea, Salix exigua*, or *Spiraea douglasii* dominated associations (Kovalchik 1993, Hansen et al. 1995, Hall and Hansen 1997). Adjacent drier riparian sites include *Populus tremuloides/Symphoricarpos albus* or *Pseudotsuga menziesii/Symphoricarpos albus* (Kovalchik 1993). Neighboring upland associations include pinyon-juniper, *Abies concolor, Pseudotsuga menziesii, Picea engelmannii, Pinus contorta,* or *Artemisia tridentata* associations (Hansen et al. 1995, Manning and Padgett 1995, Moseley 1998).

MANAGEMENT CONSIDERATIONS

Populus tremuloides/Cornus sericea provides low to moderate livestock forage due to a limited understory. However, livestock will bed in the shade of this association causing trampling, soil compaction, and weed invasion. Livestock also browse both *Populus tremuloides* root suckers and *Cornus sericea*. Overgrazing will lower vigor, eventually eliminating woody species from the site (Hansen et al. 1995, Hall and Hansen 1997, Ogle 1997). *Populus tremuloides* is intolerant of shade and reproduces mainly by clonal root suckers, but also by seeds germinating on moist mineral soil (Crowe and Clausnitzer 1997). *Cornus sericea* also reproduces from root resprouting. *Populus tremuloides* suckers grow best and proliferate after moderate intensity fire or overstory tree removal, though high intensity fires kill the roots. Fires are uncommon in this moist association and most young trees will die after a fire (though older trees resist some fires). Damage to trunks by fire allows insect or fungal species into trees which can eventually kill them (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). In order for the plant association to recover after fire or logging, livestock grazing of root suckers must be eliminated for at least three years (Ogle 1997). Though beneficial for *Populus tremuloides* reproduction, logging for the limited lumber, fenceposts, or fuel wood is often not compatible with wet, compactible soils (Hansen et al. 1995, Hall and Hansen 1997, Ogle 1997). Similarly, recreation values are high but development is not compatible due to site wetness. Both *Populus tremuloides* and *Cornus sericea* reduce erosion by slowing overland flow, providing woody debris, and stabilizing streambanks (Manning and Padgett 1995). They are also good for long-term revegetation. Moreover, decomposition of their leaf litter improves soil nitrogen, organic matter, and fertility (Kovalchik 1993).

SUCCESSIONAL DYNAMICS

Several shrub dominated plant associations appear to be early seral or transitional to *Populus tremuloides/Cornus sericea*. These associations, which colonize sites with less developed soils and recently deposited alluvium, include *Alnus incana, Betula occidentalis, Salix* spp., and *Populus trichocarpa* or *Populus angustifolia* dominated types often with a *Cornus sericea* understory (Hansen et al. 1995, Hall and Hansen 1997). Similarly, the loss of *Betula occidentalis* from the early seral *Populus tremuloides/Betula occidentalis* association would likely result in a *Populus tremuloides/Cornus sericea* association (Collins 1979, Manning and Padgett 1995). Though *Populus tremuloides/Cornus sericea* is on sites too wet for conifer dominance, changes in hydrology would result in movement toward conifer spp. (e.g. *Abies lasiocarpa, Picea* spp., *Picea engelmannii, Pinus ponderosa, Pseudotsuga menziesii*) dominance (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). For example, overgrazing by livestock and wildlife may reduce *Populus tremuloides* and shrubs, promote establishment of weedy herbaceous species and

result in replacement by the disclimax *Populus tremuloides/Poa pratensis* association (Hansen et al. 1995, Hall and Hansen 1997).

WILDLIFE FUNCTIONS

Populus tremuloides/Cornus sericea has high wildlife cover and forage value during most of year. *Populus tremuloides* suckers, buds, and bark are often heavily browsed by beaver, rabbits, moose, deer, small mammals, and elk (Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997, Ogle 1997). Moose also utilize *Cornus sericea* though its density may reduce use by some species. Numerous bird species nest and feed in aspen including grouse, flickers, red-breasted nuthatches, chickadees, sapsuckers, grosbeaks, crossbills, and woodpeckers (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). The roots and vegetation of this association often overhang streams providing excellent fish cover.

CLASSIFICATION COMMENTS

Populus tremuloides/Cornus sericea is an accepted plant association with a large amount of supporting data throughout its range. Crowe and Clausnitzer (1997) described a similar *Populus tremuloides/ Alnus incana-Cornus stolonifera* [syn. *Cornus sericea*] association which may be a variation of *Alnus incana-Cornus sericea*/Mesic forb and possibly includes *Populus tremuloides/Cornus sericea* stands. Many other studies recognize similar associations which sometimes have *Populus tremuloides* as a co-dominant species. These associations are dominated by *Betula occidentalis*, various *Populus* or conifer spp., or *Alnus incana* with a shrub layer dominated by *Cornus sericea* (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). These associations are successionally related to *Populus tremuloides/Cornus sericea* and complicate classification.

Populus trichocarpa/Crataegus douglasii

Black cottonwood/black hawthorn

RANGE

The association has been described from the Wallowa Mountains of northeastern Oregon. Stands may also occur in the adjacent regions of southeastern Washington and west central Idaho, along smaller tributaries of the Snake and Grande Ronde rivers. Low quality stands have been observed in Idaho on the lower Payette River at Montour. Stands have also been documented in eastern Idaho on the Henrys Fork and its low elevation, moderate gradient tributaries, and in the Coeur d'Alene drainage of northern Idaho.

ENVIRONMENT

The *Populus trichocarpa/Crataegus douglasii* association is found in the foothills zone of mountainous regions. This association occurs in riparian zones of moderate-sized streams and rivers.

SOILS

Soils are derived from stream-deposited alluvium and are shallow and rocky. Typically an A horizon 15 to 30 cm deep (occasionally up to 43 cm) is situated over an aerated horizon composed of coarse sands to larger unconsolidated cobbles. Texture of the surface horizon is silty to sandy loams, and organic matter content is high. Sometimes clay balls are interspersed throughout the coarse textured materials. Depth to the water table is usually less than 60 cm, and during spring averages 18 cm (Kauffman et al. 1985).

VEGETATION COMPOSITION

The vegetation composition and structure of this association is poorly described, but stands are apparently structurally diverse. The tree canopy is dominated by *Populus trichocarpa. Populus balsamifera* and *Populus acuminata* may be present at the southern and eastern limits of the range of black cottonwood. The needle-leaved evergreens, *Abies lasiocarpa* and *Picea engelmannii,* occur as scattered individuals at mid to upper elevations and may indicate a trend to a conifer type. Other shrubs include *Amelanchier alnifolia, Cornus sericea, Symphoricarpos albus,* and *Salix bebbiana.* Forb cover is somewhat sparse, due to shading, with minor amounts of *Smilacina stellata, Heracleum lanatum, Actaea rubra* ssp. *arguta, Galium boreale* and *Thalictrum* spp. present.

ADJACENT COMMUNITIES

Information on adjacent communities is unavailable.

MANAGEMENT CONSIDERATIONS

Stands of the *Populus trichocarpa/Crataegus douglasii* plant association may be so dense that most uses are precluded. However, livestock will eat the foliage of *Crataegus douglasii* and prefer stems that are less than 1 meter tall. *Populus trichocarpa* has been used to restore riparian areas. Rooted cuttings and nursery-grown seedlings may be established on moist, well-drained soils. Unrooted cuttings may also be propagated, but establishment is not as rapid as using rooted cuttings. Establishment of *Crataegus douglasii* is more difficult and growth is slow. Nursery stock transplants are recommended (USDA 2000).

SUCCESSIONAL DYNAMICS

Information on successional status and seral stage is not available.

WILDLIFE FUNCTIONS

Stands supporting *Crataegus douglasii* are important for nesting/brooding habitat, as well as for food sources, for many bird species. Small mammals also frequent habitat with *Crataegus*. Stands may also provide hiding cover and shade for other wildlife. *Crataegus* is rated as good habitat for white tail deer, mule deer, and upland game birds.

CLASSIFICATION COMMENTS

This association was originally described from Catherine Creek in eastern Oregon (Kauffman et al. 1985). Similar stands have not been described in recent classification work (Kovalchik 1993, Crowe and Clausnitzer 1997). This may represent an association that has been sampled infrequently due to occurrence at lower elevations that are outside project areas of existing classifications or stands have been altered by cumulative effects of land use practices.

Populus trichocarpa/Rosa woodsii

Black cottonwood/Wood's rose **n=4**

RANGE

This type is known from northern Yellowstone National Park, Wyoming, the lower Clearwater River canyon in north-central Idaho, and scattered locations in southern and central Idaho.

ENVIRONMENT

This type occurs on terraces and floodplains across a wide range of elevations, from below 1,000 feet in northern Idaho to above 6,000 feet in Wyoming and central Idaho. Stands can occur along small, steep-gradient streams, but are most common on larger streams and rivers with relatively low gradients. Valley bottoms range from narrow, V-shaped canyons of small streams, to moderately wide bottoms in deep canyons, to broad floodplains in intermontane valleys.

SOILS

In Wyoming, the soils have been described as being Cryofluvents composed of shallow to deep sand layers overlying river cobbles. Roots and litter of the undergrowth eventually form darkened surface horizons. Limited data suggest that surface soils are moist in spring and early summer, and either remain moist or are dry by mid-summer (Chadde et al. 1988). In Idaho, the soils are similarly sandy alluvial deposits overlying coarse cobbles (Asherin and Orme 1978).

VEGETATION COMPOSITION

Populus trichocarpa dominates the overstory tree layer. In Yellowstone, *Picea engelmannii* and *Populus angustifolia* were incidental, while in northern Idaho, *Alnus rhombifolia* was found occasionally in the overstory. Several shrubs, most notably *Rosa woodsii*, are present and form a dense understory layer. *Rosa woodsii* generally has greater than 15% cover. Exceptions are some stands along narrow valley bottoms in canyons that are subject to frequent scouring by floods. All shrubs have low cover in these settings, and *Rosa* may have only 5% cover. The herb layer consists of a diversity of mesic-site forbs and grasses, most have low abundance values and many are exotic species.

ADJACENT COMMUNITIES

Adjacent upland sites support sagebrush-steppe and canyon grasslands. Adjacent riparian associations include other *Populus trichocarpa* types, such as *P. trichocarpa/Cornus sericea, Betula occidentalis*, and various willow-dominated associations.

MANAGEMENT CONSIDERATIONS

Prolonged ungulate use results in a loss of some of the palatable shrubs and possibly an initial increase in *Rosa*. Continued use may result in an eventual conversion to structurally depauperate stands with few shrubs and high cover of *Poa pratensis*.

SUCCESSIONAL DYNAMICS

The *Populus trichocarpa/Rosa woodsii* plant association has been considered a long-lived seral association, possibly resulting from heavy use by cattle (Asherin and Orme 1978) or native ungulates (Chadde et al. 1988). It is less clear that stands sampled in southwestern Idaho resulted from heavy grazing. Asherin and Orme (1978) suggested that this may be a seral stage of Daubenmire's (1970) *Populus trichocarpa/Cicuta douglasii* habitat type. Chadde et al. (1988) suggests that conifers may eventually form stable associations on sites in Yellowstone.

WILDLIFE FUNCTIONS

The *Populus trichocarpa/Rosa woodsii* association provides browse and forage for numerous mammals and bird species. Structural diversity is typically high due to multi-layered vegetation, although it can be only moderate in stands with low shrub cover. Rosehips are an important source of food for bears during the late summer and fall.

CLASSIFICATION COMMENTS

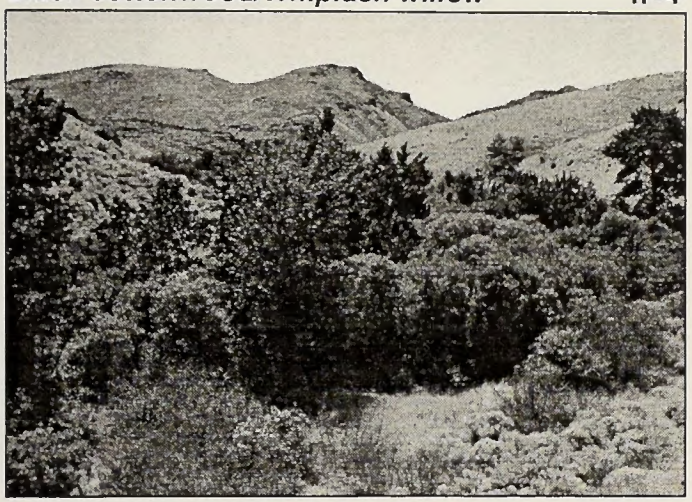
This association is quantitatively defined by seven plots in Yellowstone National Park Park (Chadde et al. 1988), four plots in southwest Idaho (Moseley 1999) and two plots in northern Idaho (Asherin and

Orme 1978), supplemented with additional plots and observations from southern Idaho.

SPECIES	CON	COVER	MIN	MAX
TREES				
Populus trichocarpa	100	57	20	98
SHRUBS				
Clematis ligusticifolia	50	7.5	0	20
Cornus sericea	25	5	0	20
Philadelphus lewisii	50	5.25	0	20
Prunus virginiana	50	1	0	3
Ribes aureum	75	1.25	0	3
Rosa woodsii	100	36	3	98
Sambucus cerulea	50	5.75	0	20
Toxicodendron rydbergii	50	1	0	3
FORBS				
Asperugo procumbens	50	15	0	40
Conium maculatum	50	1	0	3
Galium aparine	75	3.5	0	10
Lactuca serriola	75	1.25	0	3
Medicago lupulina	50	1	0	3
Montia perfoliata	50	2.75	0	10
Nemophila kirtleyi	50	1	0	3
Rumex crispus	75	1.75	0	3
FERNS/FERN ALLIES				
Equisetum arvense	50	7.75	0	30
GRAMINOIDS				
Bromus japonicus	75	1.75	0	3
Bromus tectorum	75	0.75	0	1
Elymus glaucus	50	1	0	3
Leersia oryzoides	25	2.5	0	10
Poa bulbosa	75	7.75	0	20
Poa pratensis	75	13.25	0	30

Populus trichocarpa/Salix lasiandra

Black cottonwood/Whiplash willow **n=4**



RANGE

This association was originally described from the Blue and Wallowa mountains of Oregon (Crowe and Clausnitzer 1997). It has been sampled in adjacent west-central Idaho (Moseley 1998).

ENVIRONMENT

This type association is found on low to mid-elevation alluvial bars and in abandoned channels of major rivers and streams. Sampled stands are in narrow to broad (30–100 m), low gradient (1-3%), trough- or flat-shaped valleys. Stands develop on coarse alluvial deposits of sand, gravel, cobbles, and boulders. Soil surface cover can be as high as 70% bare ground, gravel, and rock due to annual scouring from the adjacent watercourse.

SOILS

Soils are derived from mixed alluvial parent material and the substrate is river gravel and cobble. Total rooting depth is 30 cm and depth to water table is 35 cm, while depth to mottling is 15 cm (Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Populus trichocarpa, Salix lasiandra, and *Salix lutea* are pioneering trees and shrubs on coarse-textured alluvial surfaces along major streams and rivers. Most of the stands have cottonwood seedlings and saplings as potential overstory. Because of continued disturbance from seasonal flooding, development into mature stands is probably rare. Conifer regeneration may be present but will not develop unless protected from the annual cycle of scouring, flooding, and ice damage on these sites. Shade-intolerant *Salix lasiandra* is usually well represented to abundant. *Salix lasiolepis, Salix lutea,* and *Ribes aureum* are sometimes present. Pioneering forbs are common and introduced rhizomatous grasses are occasionally abundant (Crowe and Clausnitzer 1997). The native graminoid *Elymus glaucus* was present in all Idaho stands sampled by Moseley (1998).

SPECIES	CON	COVER	MIN	MAX
TREES				
Populus trichocarpa	100	53.3	40	70
SHRUBS				
Alnus incana	33	1.7	0	5
Clematis ligusticifolia	100	1.7	1	3
Cornus sericea	33	3.3	0	10
Philadelphus lewisii	67	2.7	0	5
Ribes aureum	67	0.7	0	1
Salix exigua	33	3.3	0	10
Salix lasiandra var. caudata	100	40.0	20	60
Salix lasiolepis	33	6.7	0	20
FORBS				
Hypericum perforatum	67	0.7	0	1
Lactuca serriola	67	0.7	0	1
FERNS/FERN ALLIES				
Equisetum hyemale	33	10.0	0	30
GRAMINOIDS				
Elymus glaucus	100	8.0	1	20
Poa bulbosa	67	0.7	0	1
Poa pratensis	33	6.7	0	20

ADJACENT COMMUNITIES

Adjacent upland associations include Douglas fir, grand fir, ponderosa pine, and bitterbrush associations. The most common adjacent riparian associations are *Populus trichocarpa/ Symphoricarpos albus* (Crowe and Clausnitzer 1997) and *Salix lasiandra*/Bench.

MANAGEMENT CONSIDERATIONS

Domestic livestock may browse juvenile black cottonwood heavily, affecting long-term stand dynamics (Hansen et al. 1995). This association aids stabilization of streamside soils. As stands of this type mature, they provide shade and woody debris to maintain fish habitat (Crowe and Clausnitzer 1997).

SUCCESSIONAL DYNAMICS

The *Populus trichocarpa/Salix lasiandra* type is continually disturbed by spring floods from snowmelt. This is the probable cause of low vegetative ground cover. One stand sampled in Idaho was thoroughly

burned in 1986; regeneration of black cottonwood and willow species was vigorous. This type is early-successional, establishing on fresh alluvial bar deposits and scoured floodplains. Annual flooding maintains the association.

WILDLIFE FUNCTIONS

This type provides important habitat for a variety of wildlife species. Songbirds, beaver, and deer are the prominent users of this habitat (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

This plant association was originally described by Crowe and Clausnitzer (1997) from Oregon, using quantitative methods. It was subsequently sampled at four locations in southwestern Idaho (Moseley 1998).

Populus trichocarpa/Salix lutea

Black cottonwood/yellow willow **n=1**

RANGE

This type has been documented in central Nevada, northern Nevada, southwest Idaho, and central Idaho. This type may also occur in northeastern Oregon.

ENVIRONMENT

Stands occupy stream bars and low benches that are generally flooded annually at spring high water. It can occur along small streams as well as large rivers. Consequently, valley bottom widths range from narrow to broad (<50 m to over 300 m).

SOILS

Soils are young alluvial deposits, often with greater than 35% coarse fragments. The presence of *Salix lutea, Salix exigua,* and *Cornus sericea* reflects high soil moisture, at least early in the growing season. These sites typically dry out as the stream level drops in late summer (Manning and Padgett 1995).

VEGETATION COMPOSITION

Populus trichocarpa dominates the overstory, with *Salix lutea* dominating a structurally complex and usually dense understory layer. Other tall shrubs that occur in this layer include *Salix lasiandra, Cornus sericea, Salix exigua, Salix geyeriana, Amelanchier alnifolia*, and *Alnus incana,* among others. Beneath the tall shrubs is a diverse layer of shorter shrubs, including various *Ribes* spp. and *Rosa woodsii.* The herbaceous layer is sparse, probably because of the dense shade.

ADJACENT COMMUNITIES

Adjacent upland sites support sagebrush-steppe, *Juniperus scopulorum* woodlands, and pinyon-juniper woodlands. Adjacent riparian communities include other *P. trichocarpa* types and various willow-dominated communities.

SPECIES	CON	COVER	MIN	MAX
TREES				
Juniperus scopulorum	100	3	3	3
Populus trichocarpa	100	50	50	50
SHRUBS				
Alnus incana	100	3	3	3
Cornus sericea	100	3	3	3
Ribes aureum	100	3	3	3
Ribes inerme	100	10	10	10
Rosa woodsii	100	3	3	3
Rubus idaeus	100	30	30	30
Salix geyeriana	100	10	10	10
Salix lasiandra var. caudata	100	10	10	10
Salix lutea	100	60	60	60
FORBS				
Galium triflorum	100	1	1	1
Smilacina stellata	100	1	1	1
Urtica dioica	100	1	1	1
FERNS/FERN ALLIES				
Equisetum hyemale	100	1	1	1
GRAMINOIDS				
Carex athrostachya	100	1	1	1
Carex lanuginosa	100	1	1	1
Elymus glaucus	100	1	1	1

MANAGEMENT CONSIDERATIONS

The high shrub density typically limits livestock access. Livestock will tend to use narrow corridors that pass through this association.

SUCCESSIONAL DYNAMICS

The successional dynamics in this association are unclear. Kauffman et al.'s (1985) gravel bar/*Salix* spp./mixed forb plant association may represent an early seral stage of the *P. trichocarpa/Salix lutea* association.

WILDLIFE FUNCTIONS

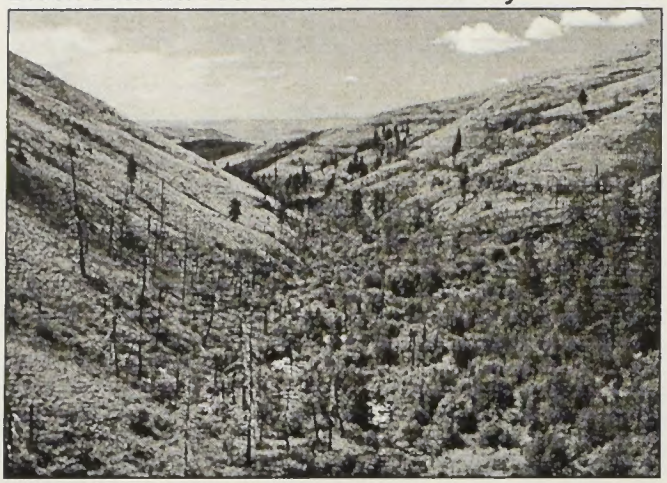
This structurally diverse type provides habitat for wildlife and avian species.

CLASSIFICATION COMMENTS

Manning and Padgett (1995) described a *Populus/Salix* plant association from Nevada, which is dominated by either *P. angustifolia* or *P. trichocarpa*, depending on the geographic region of the state. *Salix lutea* is the shrub dominant in all but a single stand. Their broad type includes the *Populus trichocarpa/Salix lutea* association described here.

Populus trichocarpa/Symphoricarpos albus

Black cottonwood/common snowberry **n=1**



RANGE

This type has been described with plot data from the Blue and Wallowa mountains of northeastern Oregon, the Coeur d'Alene River drainage in northern Idaho, and southwest Idaho (Moseley and Bursik 1994, Crowe and Clausnitzer 1997, Moseley 1998).

ENVIRONMENT

This type occurs at mid-elevations, on gentle terraces along major rivers and streams in the mountains of central and northern Idaho and adjacent Oregon. Valley widths are usually broad (100 –300 m), but can be as narrow as 30 m wide. Valleys are V-, flat- and trough-shaped with moderate gradients (2-5%) and steep side slopes. Sites are on inactive floodplains and are infrequently flooded. The water table is generally deep. Mottling was evident on only one plot from Oregon (Moseley and Bursik 1994, Crowe and Clausnitzer 1997).

SOILS

The plant association occupies deep alluvial soils with fine-textured surface horizons over sand, gravel, and rocks.

VEGETATION COMPOSITION

Populus trichocarpa dominates the overstory, with the potential for conifers to be present in all layers. Although irregular in occurrence, conifer species such as *Pinus ponderosa, Abies grandis, Pseudotsuga menziesii*, and *Picea engelmannii*, may indicate community potential on these terrace sites. The shrub component is dominated by *Symphoricarpos albus* with a diversity of other tall and medium shrubs scattered in the stands, the most prominent being *Crataegus douglasii, Amelanchier alnifolia, Cornus sericea*, and *Philadelphus lewisii*. The herbaceous layer is diverse, containing many forbs and perennial grasses, including both rhizomatous and caespitose species (Moseley and Bursik 1994, Crowe and Clausnitzer 1997).

SPECIES	CON	COVER	MIN	MAX
TREES				
Populus trichocarpa	100	40	40	40
SHRUBS				
Alnus incana	100	10	10	10
Betula occidentalis	100	10	10	10
Philadelphus lewisii	100	20	20	20
Prunus virginiana	100	10	10	10
Rubus idaeus	100	5	5	5
Sambucus cerulea	100	5	5	5
Symphoricarpos albus	100	20	20	20
FORBS				
Smilacina stellata	100	1	1	1
FERNS/FERN ALLIES				
Equisetum hyemale	100	1	1	1
GRAMINOIDS				
Elymus glaucus	100	70	70	70
Poa pratensis	100	10	10	10

ADJACENT COMMUNITIES

Northern Idaho stands are adjacent to *Tsuga heterophylla* associations (Moseley and Bursik 1994), while *Pseudotsuga menziesii* and *Purshia tridentata* associations are adjacent to stands in west-central Idaho. *Pseudotsuga menziesii, Pinus ponderosa,* and *Abies grandis* associations occur in the adjacent uplands in Oregon (Crowe and Clausnitzer 1997).

MANAGEMENT CONSIDERATIONS

Understory cottonwoods and shrubs are browsed by both domestic and wild ungulates. Continuous and severe grazing results in a decline in the *Symphoricarpos albus* component, while *Poa pratensis* increases in abundance.

SUCCESSIONAL DYNAMICS

The *Populus trichocarpa/Symphoricarpos albus* type usually occurs on inactive floodplains, which flood only episodically. This may result in eventual succession to a conifer type, although the terrace may be washed away from lateral movement of the channel before succession takes place (Moseley and Bursik 1994). Wildfire may also maintain this type, as

has been documented from a 1931 fire in northern Idaho (Bursik and Moseley 1994) and a 1986 fire in west-central Idaho.

WILDLIFE FUNCTIONS

The shrub understory of this association provides nesting habitat and food for both nongame and game birds while the overstory is used by woodpeckers, raptors, and other birds for foraging, nesting, and roosting (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

Classification is based on five plots throughout the mountains of northeastern Oregon (Crowe and Clausnitzer 1997), 18 plots in Spion Kop RNA along the Coeur d'Alene River (Moseley and Bursik 1994), and one plot in Goodrich Creek RNA.

Populus trichocarpa/Acer glabrum

Black cottonwood/Rocky Mountain maple **n=1**

RANGE

This type is known from northeastern Oregon and adjacent west-central Idaho. It is also likely to occur in northeastern Washington.

ENVIRONMENT

The *Populus trichocarpa/Acer glabrum* association occurs on low to mid-elevation terraces and floodplains ranging from 2,500 to 5,000 feet. Most stands are in moderate to very high gradient (4% to 10%), V-shaped valleys of narrow to moderate width. Adjacent stream reach types in Oregon and Idaho are A2, A3, B2, C3, and C4. Stream widths range from 1 to 15 m (Crowe and Clausnitzer 1997).

SOILS

This type is found on alluvial deposits of silt, sand, gravel, cobbles, and stones. The principal substrate is composed of sand and cobbles (Crowe and Clausnitzer 1997).

SPECIES	CON	COVER	MIN	MAX
TREES				
Populus trichocarpa	100	90	90	90
SHRUBS				
Acer glabrum	100	60	60	60
Cornus sericea	100	10	10	10
Philadelphus lewisii	100	10	10	10
Symphoricarpos albus	100	40	40	40
FORBS				
Galium aparine	100	60	60	60
Osmorhiza chilensis	100	3	3	3
Smilacina stellata	100	3	3	3

VEGETATION COMPOSITION

Populus trichocarpa dominates the overstory tree layer. Conifer species are regular components of sampled stands in Oregon, dominating the lower tree layers. *Acer glabrum* typifies a diverse tall shrub layer of *Amelanchier alnifolia, Cornus sericea, Philadelphus lewisii,* and *Crataegus douglasii*, with *Symphoricarpos albus* occurring beneath. While the herb layers consist of a diverse array of mesic-site species, most have low cover and are poorly represented (Crowe and Clausnitzer 1997).

ADJACENT COMMUNITIES

Adjacent upland sites support *Juniperus occidentalis* woodlands, canyon grasslands, and several *Abies grandis* associations. Adjacent riparian associations include other *Populus trichocarpa* types, *Betula occidentalis, Populus tremuloides*, and various willow-dominated associations.

MANAGEMENT CONSIDERATIONS

Black cottonwood is important habitat for a variety of wildlife. Fire and silviculture may be used in this type to arrest succession to conifer species (Crowe and Clausnitzer 1997).

SUCCESSIONAL DYNAMICS

The constancy and abundance of *Abies grandis* regeneration in Oregon stands indicates that it may be the site potential here; possibly being seral to the *Abies grandis/Acer glabrum* association (Crowe and Clausnitzer 1997).

WILDLIFE FUNCTIONS

Acer glabrum is an important browse species for wild ungulates and provides food and cover for birds, squirrels, and chipmunks. Associated shrubs, while not as abundant, provide similar habitat elements for wildlife needs (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

This association is well-defined by Crowe and Clausnitzer (1997). Kovalchik (1993) identified this as a potential type, but did not fully describe it.

Salix amygdaloides

Peachleaf willow

RANGE

The *Salix amygdaloides* plant association is reported from South Dakota, Colorado, Montana, Idaho, and Wyoming.

ENVIRONMENT

Stands of *Salix amygdaloides* are found in lower elevation riparian habitats including backwater areas, overflow channels, and terraces of large rivers. It is also found on narrow floodplains of small creeks, in moist ravines and ditches, and at the edge of ponds or lakes (USDA 2000).

SOILS

Soil textures are variable but most commonly stands are found on sandy or silty alluvium and can tolerate saline or alkaline soils

VEGETATION COMPOSITION

Salix amygdaloides dominates the overstory with over 20 percent cover. *Populus trichocarpa* or *Populus deltoides* may be present with less than 10 percent cover as the tallest tree. Other native shrubs include *Salix lutea, Salix exigua*, and *Cornus sericea*. Native herbaceous species include *Equisetum* spp., *Smilacina stellata, Agropyron smithii, Elymus triticoides*, and *Carex lanuginosa*. Exotic plant species usually dominate the understory and may include high cover of *Agropyron repens, Agrostis stolonifera, Bromus tectorum, Cardaria draba, Cirsium arvense, Melilotus* spp., and *Poa pratensis*.

ADJACENT COMMUNITIES

Adjacent stands of riparian vegetation may include stands dominated by *Carex* spp., *Phalaris arundinacea*, or *Populus* spp. Uplands are usually sagebrush-steppe.

MANAGEMENT CONSIDERATIONS

Non-native species that are already present in stands will increase with disturbance. Grazing will decrease vigor of *Salix amygdaloides* and stems may be knocked over by livestock. Stands do recover rapidly when livestock are excluded. Cuttings may be used for revegetation and will stabilize disturbed alluvium (USDA 2000).

SUCCESSIONAL DYNAMICS

Salix amygdaloides is a rapidly growing, early successional species that becomes established on alluvial deposits. Regeneration is primarily by seeds that are only viable for a few days. It does not produce suckers, but will resprout from the root crown or stem base if cut or burned. Broken pieces of stem or root that are transported by floodwaters may also sprout. Trees are reported to live for about 30 years until it is shaded out by other riparian forest trees (USDA 2000). In Montana it is considered a successional stage of *Fraxinus pennsylvanicus* and *Acer negundo* dominated associations (Hansen et al. 1995). In Idaho and other states it may be seral to cottonwood stands dominated by *Populus angustifolia, P. deltoides,* or *P. trichocarpa* (Hall and Hansen 1995).

WILDLIFE FUNCTIONS

Stands have high structural diversity, which provides shade and hiding cover for a variety of wildlife species (Hansen et al. 1995). *Salix amygdaloides* is rated as providing good habitat for white-tailed deer, small nongame birds, and upland game birds (USDA 2000).

CLASSIFICATION COMMENTS

The *Salix amygdaloides* plant association has been described as a dominance type or cover type in Idaho, Montana, Wyoming, and South Dakota (Hansen et al. 1995, Hall and Hansen 1997). The dominance type includes Kituku's (1995) *Salix amygdaloides/Rhus trilobata/Dipsacus fullonum* association. Stands are usually at lower elevations with numerous impacts. The poor condition of stands complicates classification.

MISCELLANEOUS FORESTED PLANT ASSOCIATIONS

Unclassified Populus tremuloides/ tall shrub communities

Unclassified quaking aspen/tall shrub

(6 plots)

In southwest Idaho, six *Populus tremuloides* stands were sampled at the Rocking M Ranch in the

foothills of Hitt Mountain at the southern end of Hells Canyon (Moseley 1999). Stands averaged 4,298 feet elevation (ranging from 3,440 to 4,800 feet) and were found in the Dennett, Raft, and Wolf Creek drainages (tributaries to the Snake River, above Brownlee Reservoir). Sites were streambanks, floodplains, and low alluvial terraces in steep-sided and narrow valleys of small, moderate-gradient perennial streams. Stands formed riparian stringers, or occasional patches on mesic toe-slopes or near seeps and were surrounded by *Artemisia tridentata*-steppe or mountain shrub fields.

In all stands sampled *Populus tremuloides* cover averaged over 50 percent and were mostly pole and medium-sized dbh trees 9 to 18 m tall. *Alnus incana* was occasionally present with less than 10% cover. The tall shrub understory was variable; however, *Prunus virginiana, Acer glabrum*, and/or *Philadelphus lewisii* (sometimes in combination) were common in all but one stand sampled. This heterogeneity made classification complex. Numerous *Populus tremuloides* types with tall shrub understories have been documented from throughout the western United States (Mueggler 1988, Reid et al. 2000), including several in riparian or wetland settings (Evans 1989, Evenden 1989, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Oregon Natural Heritage Program 1999). These previously described riparian types have *Alnus incana, Amelanchier alnifolia, Prunus virginiana, Salix scouleriana*, and *Salix* spp. as understory tall shrub indicator species.

Two stands sampled on the Rocking M were probably most similar to *Populus tremuloides/Prunus virginana* plant associations having 40 to 50% cover of *Prunus virginiana*. In these stands, *Philadelphus lewisii, Symphoricarpos albus*, and *Rosa woodsii* were also notable, though none of these species were common. Two other stands sampled were probably most similar to *Populus tremuloides/Acer glabrum* having 40 to 70% cover of *Acer glabrum*. *Prunus virginiana* was also noticeable in these stands (up to 30% cover) as well as *Philadelphus lewisii* (in one stand). One other stand, with an open *Populus tremuloides* canopy, had a tall shrub understory dominated by *Philadelphus lewisii*. Another stand, with a closed canopy, had a low shrub understory with 10% cover of *Symphoricarpos albus (Populus tremuloides/Symphoricarpos albus* as in Kovalchik 1987, Crowe and Clausnitzer 1997, Crawford 2000). However, *Acer glabrum, Prunus virginiana*, and/or *Amelanchier alnifolia* were present in minor amounts in each of these other stands. The herbaceous understories were diverse and variable in all stands, with numerous weedy or annual species that further complicated classification. In 5 of 6 stands sampled, *Poa pratensis* was either the dominant or co-dominant understory herbaceous species, having up to 40% cover. *Elymus glaucus* was co-dominant or notable in 4 stands. One or two tall forbs, especially *Urtica dioica and Osmorhiza chilensis*, and to a lesser extent, *Smilacina stellata* and *Senecio serra*, were usually present in each stand with moderately high cover. Weedy annual vernal species, especially *Stellaria media* and *Montia perfoliata* but also *Galium aparine* were very common. Many other weedy, exotic species were also common, but with lower cover, reflecting a long the long history of livestock grazing, periodic floods, road building, and other disturbances in these stands. Further sampling of less disturbed stands is needed in southwestern Idaho to better refine the classification.

Populus trichocarpa/Poa pratensis community type

Black cottonwood/Kentucky bluegrass

(3 community observations)

Though not sampled at any of the reference sites, the *Populus trichocarpa/Poa pratensis* community type was observed at low elevations (usually about 2500 to 2800 feet) along the Boise (e.g., Boise) and Payette rivers (e.g., Montour) (Jankovsky-Jones et al. 2000). This plant association represents degraded conditions of older *Populus trichocarpa* stands on well-drained sandy loam soil of alluvial point bars and islands that do not flood every year (Hansen et al. 1995, Jankovsky-Jones et al. 2000). These islands and bars are higher and drier than landforms supporting neighboring associations, such as *Populus trichocarpa/Salix lutea, Salix lutea*/Bench, and scrub-shrub types dominated by *Alnus incana, Betula occidentalis, Cornus sericea, Salix exigua*, and *Salix lasiandra* (Moseley 1998, 1999, Jankovsky-Jones et al. 2000). There are often backwater channels or swales found as inclusions in this type, usually dominated by mesic graminoid species or emergent vegetation. This plant association is related to drier *Populus trichocarpa* plant associations, such as *Populus trichocarpa/Crataegus douglasii, P. trichocarpa/Rosa woodsii*, and *P. trichocarpa/Symphoricarpos albus*, with which it may inter-mix (Moseley 1998, 1999, Jankovsky-Jones et al. 2000).

The *Populus trichocarpa/Poa pratensis* community represents a disturbance disclimax (e.g., usually livestock grazing) of the aforementioned

associations (Hansen et al. 1995). The *Populus trichocarpa/Poa pratensis* community has not been formerly described though a similar *Populus trichocarpa/Symphoricarpos albus/Poa pratensis* community is known from east-central Oregon (Kovalchik 1987). Hansen et al. (1995) described a synonymous *Populus trichocarpa*/Herbaceous type in western Montana and Weixelman et al. (1996) identified a very similar *Populus* spp.-stream terrace ecological type in Nevada. The fluvial settings and environmental disturbances are also very similar to the *Populus angustifolia/Poa pratensis* plant association (Youngblood et al. 1985, Padgett et al. 1989, Manning and Padgett 1995). The *Populus trichocarpa/Artemisia ludoviciana* association from eastern Oregon appears similar but lacks significant cover and constancy of *Poa pratensis* and other weedy species (Oregon Natural Heritage Program 1999).

In southwest Idaho, stands are dominated by mature and tall *Populus trichocarpa* forming a broken canopy over a heterogeneous and weedy understory (Jankovsky-Jones et al. 2000). The only *Populus* reproduction is from root suckering. The understory shrub layer is sparse and lacks any species with consistently high cover. *Amorpha fruticosa, Crataegus douglasii, Ribes aureum, Rosa* spp. (e.g., *Rosa woodsii* and *R. canina*), *Salix* spp. (e.g., *Salix exigua*), and *Toxicodendron rydbergii* may all be present with low cover. Exotic graminoid species, including *Poa pratensis, Agrostis stolonifera, Agopyron repens, Phalaris arundinacea, Bromus inermis, Poa bulbosa, P. compressa*, and annual *Bromus* spp. (in order of importance), typically dominate the understory. However, patches of native tall forbs, such as *Achillea millefolium, Artemisia ludoviciana, Asclepias speciosa, Aster* spp., *Equisetum* spp., *Euthamia occidentalis, Smilacina* spp., and *Solidago* spp., can be locally dominant. A few native graminoids are typically observed with low cover, including *Agropyron smithii, Carex douglasii, C. lanuginosa, Elymus triticoides*, and *Juncus* spp.. Exotic weedy forbs are widespread and diverse with the most common being *Cirsium arvense, C. vulgare, Rumex* spp., *Solanum dulcamara*, and *Verbascum thapsus.*

The high cover of exotic weedy species in the understory of these *Populus trichocarpa* stands reflects the long history of livestock grazing and other disturbances. Many stands have been severely altered by dike construction (e.g., soil removal and subsequent prevention of floods), bridge and road construction, housing development, placer mining, recreation use, and hydrologic changes (e.g., canals and diversions, dams and reservoirs, and bank rip-rapping) (Kaltenecker et al. 1994, Moseley and Bursik 1994, Hansen et al. 1995, Jankovsky-Jones et al. 2000). Moreover, vast acreage of *Populus trichocarpa* stands have been cleared for agriculture, sand and gravel mining, and urban development--to the detriment of wintering bald eagles, osprey, deer, beaver, and other bird and wildlife species (Kaltenecker et al. 1994). The combination of soil disturbance and hydrologic changes (especially the lack of frequent flooding) has prevented the re-establishment of *Populus trichocarpa* on formerly suitable sites. Instead, the lower elevation river bars and islands of the Boise, Payette, Snake (e.g., between Payette and Weiser), and Weiser rivers have been converted to forested wetlands composed of exotic hardwood trees better adapted to these new conditions. These species include *Acer negundo, A. saccharinum, Eleagnus angustifolia, Fraxinus pennsylvanica, Juglans nigra, J. regia, Malus pumila, Morus alba, Populus deltoides, P. fremontii, Prunus ceracifera and other exotic Prunus spp., Robinia pseudo-acacia, Salix alba, Ulmus americana, U. pumila*, and others (Johnson 1995, Jankovsky-Jones et al. 2000). Exotic shrub species, such as *Amorpha fruticosa, Lycium spp., Rosa canina* and other *Rosa* spp., and others, as well as *Phalaris arundinacea*, have concurrently invaded the understories of these sites (Jankovsky-Jones et al. 2000).

Populus trichocarpa/Barren Plant Association

Black cottonwood/Barren

(2 community observations)

Two observations of *the Populus trichocarpa*/Barren plant association were made at low elevations (below 2800 feet) on annually flooded alluvial point bars and islands of the Boise River (Jankovsky-Jones et al. 2000). Similar stands have been documented wherever *Populus trichocarpa* is found on large river systems (e.g., Moseley and Bursik 1994, Hansen et al. 1995). These stands were mostly composed of early seral seedlings and saplings up to 3 m tall. However, at the upper high water periphery of the point bars and islands older *Populus trichocarpa* trees were widely scattered. A variety of shrubs, such as *Alnus incana, Amorpha fruticosa, Ribes aureum, Rosa woodsii, Salix exigua, and Salix lutea*, and seedlings of exotic hardwoods (e.g., *Acer negundo, A. saccharinum, Fraxinus pennsylvanica*, and *Salix alba*) were widely scattered as individuals or small patches with low total cover. The understory

was diverse but total herbaceous cover was scarce. The most common species were ephemeral, often weedy, annuals or biennials such as *Conyza canadensis*, *Cyperus* spp. (especially *Cyperus aristatus*), *Eragrostis pectinacea, Gnaphalium palustre, Crypsis alopecuroides, Juncus bufonius, Melilotus spp., Lindernia dubia, Panicum capillare, Potentilla biennis, Rotala ramosior, Verbascum thapsus, and Veronica peregrina*. Common perennial herbs were often early seral species, such as *Agrostis exarata, A. scabra, Artemisia ludoviciana, Aster spp., Carex lanuginosa, Epilobium ciliatum, Equisetum* spp., *Euthamia occidentalis, Grindelia squarrosa, Juncus tenuis*, and *Lythrum salicaria*. These flood-scoured point bars and islands are kept barren by annual flood scouring creating shallow sandy-clay soils over river cobble (Jankovsky-Jones et al. 2000). Annually flooded sites supporting the early seral *Populus trichocarpa*/Barren plant association are essential for the persistence and reproduction of riverine *Populus trichocarpa* corridors such as those found on the lower Boise, Payette, and Weiser rivers (Kaltenecker et al. 1994, Hansen et al. 1995, Jankovsky-Jones et al. 2000). Unfortunately, due to dam construction which limits flood flows, constricted floodplains resulting from dike construction, and other hydrologic alterations, such sites are now very rare and the long-term persistence of *Populus trichocarpa* is threatened (see comments above).

Plant associations expected to occur or noted but not sampled

Within the study area forested riparian plant associations dominated by *Abies grandis* are expected to occur at moderate elevations north of the Payette River but none were sampled or observed. Various other riparian plant associations dominated by *Pinus ponderosa, Populus tremuloides, Populus trichocarpa*, and *Pseudotsuga menziesii* are also expected (Crowe and Clausnitzer 1997). A number of human-induced forested riparian plant associations were observed but not sampled (Johnson 1995, Jankovsky-Jones et al. 2000). These included the following stands:

**Eleagnus angustifolia* (often *with Phalaris arundinacea* and other exotic weedy spp. in understory)—common along Snake River and elsewhere

*Exotic Hardwood Bottomland and Riparian Forest (composed of *Acer negundo, A. saccharinum, Fraxinus pennsylvanica, Juglans spp., Morus alba, Populus deltoides, P. fremontii, Salix alba, Ulmus* spp., and other spp. with exotic *Prunus* spp., *Rosa* spp., and herbs in the understory)—common along lower Boise, Payette, and Snake rivers (near Weiser)

**Fraxinus pennsylvanica*—known from southern Hells Canyon of the Snake River

**Juglans* spp. (e.g., *Juglans nigra* or *J. regia*)—known from southern Hells Canyon of the Snake River

**Populus alba* (including "Lombardy poplar")—common around ranches, agricultural fields, and old homesteads

**Populus deltoides*—known from Lake Lowell and other locations on lower Boise and Snake rivers near Weiser)

**Robinia pseudo-acacia*—common around ranches, agricultural fields, and old homesteads

WOODLAND ASSOCIATIONS

Juniperus occidentalis ephemeral drainage

Western juniper ephemeral drainage **n=3**

RANGE

The *Juniperus occidentalis* ephemeral drainage plant association is known only from the tablelands immediately surrounding Juniper Mountain (from the East Fork Owyhee River to the North Fork Owyhee River) in southwest Idaho. This plant association has been sampled along the canyon breaks of the East Fork Owyhee River below the confluence of the South Fork Owyhee River on the 45 Ranch Allotment (Moseley 1999). It also occurs on both the north and south flanks of Juniper Mountain and on the breaks of the North Fork Owyhee River canyon (Rust et al. 2000). It is expected to occur in the Owyhee Uplands of adjacent Oregon. Until further sampling proves otherwise, this plant association is considered uncommon.

ENVIRONMENT

The *Juniperus occidentalis* ephemeral drainage plant association is found on plateau/tablelands and canyon breaks at elevations ranging from 4960 to 5605 feet (Moseley 1999, Rust et al. 2000). It occurs in rocky drainages that are seasonably or intermittently moist. These ephemeral drainages usually, but not always, carry surface water every year during spring snowmelt and from occasional large rainfall events (Moseley 1999, Rust et al. 2000). The drainages are typically low gradient, less than 5 m wide, and have little entrenchment.

SOILS

The drainage bottoms supporting this association have shallow, gravelly loam soils forming a matrix between moss-covered volcanic cobbles, stones, and boulders.

SPECIES	CON	COVER	MIN	MAX
TREES				
Juniperus occidentalis	100	53.3	50	60
Pseudotsuga menziesii	33	3.3	0	10
SHRUBS				
Acer glabrum	33	1.0	0	3
Artemisia arbuscula	67	0.7	0	1
Artemisia tridentata ssp. vaseyana	33	1.0	0	3
FORBS				
Achillea millefolium	67	0.7	0	1
Arenaria congesta	67	0.7	0	1
Epilobium brachycarpum	67	0.7	0	1
Haplopappus uniflorus var uniflorus	67	0.7	0	1
Lactuca serriola	67	0.7	0	1
Lomatium nudicaule	33	1.0	0	3
GRAMINOIDS				
Agropyron smithii	67	0.7	0	1
Bromus tectorum	67	3.7	0	10
Eleocharis palustris	67	0.7	0	1
Festuca idahoensis	67	10.0	0	20
Poa nevadensis	67	4.3	0	10
Danthonia californica	33	1.0	0	3
Elymus glaucus	33	13.3	0	40
Poa bulbosa	33	3.3	0	10
Poa pratensis	33	6.7	0	20
Sitanion hystrix var hordeoides	33	1.0	0	3

VEGETATION COMPOSITION

The *Juniperus occidentalis* ephemeral drainage association is characterized by stringers of open woodlands of *Juniperus occidentalis*. Stands are mixed aged, with cover ranging from 15 to 60% (Moseley 1999, Rust et al. 2000). There is typically some *Artemisia arbuscula* (usually low cover) scattered in the diverse herbaceous understory. *Festuca idahoensis* and *Poa nevadensis* are the most common, graminoids with *Festuca* sometimes forming patches around the bases of juniper trees. However, *Danthonia californica* and *Carex douglasii* are occasionally prominent, especially in shallow, gravelly soil pockets. Other graminoids include *Sitanion hystrix, Agropyron smithii, Deschampsia danthonioides, Hordeum* spp. (*Hordeum brachyantherum* and *H. jubatum*), and *Eleocharis palustris*. The most commonly occurring forbs, though all with low cover, are *Lomatium nudicaule, Haplopappus uniflorus, Arenaria congesta,* and *Antennaria luzuloides* (Moseley 1999, Rust et al. 2000).

ADJACENT COMMUNITIES

At lower elevations, the plant association is surrounded by uplands dominated by *Artemisia arbuscula* or *Artemisia tridentata* (ssp. *wyomingensis* or *tridentata*) often with *Festuca idahoensis* understories (Moseley 1999, Rust et al. 2000). Higher elevation sites are neighbored by upland *Juniperus occidentalis* stands frequently with *Artemisia tridentata* ssp. *vaseyana* and *Festuca idahoensis* in the understory (Moseley 1999, Rust et al. 2000). Adjacent plant associations in ephemeral drainages may include those dominated by *Artemisia arbuscula* or *Danthonia californica*.

MANAGEMENT CONSIDERATIONS

The palatability of *Juniperus occidentalis* is low and livestock rarely browse it (USDA 2000). However, cattle use *Juniperus occidentalis* for shade and are attracted to the lush patches of highly palatable and nutritious *Festuca idahoensis* around tree bases. These uses, combined with the attraction of occasional vernal pools in ephemeral drainages, make this association susceptible to damage from overgrazing. Excessive grazing, especially in the spring, causes soil compaction, increased erosion and runoff, invasion by exotic species, and increased *Juniperus occidentalis* reproduction (USDA 2000). Severe fires usually kill *Juniperus occidentalis* trees, especially younger thin-barked trees (USDA 2000). Larger trees may survive low intensity ground fires that occur in open habitats. Cutting of *Juniperus occidentalis* occasionally occurs to both reduce its density (promoting grass production) and for wood products. *Juniperus occidentalis* wood is used for rot resistant fenceposts, pole structures, charcoal, clean burning firewood, decorative projects, and other uses (USDA 2000). Its foliage, cone-berries, and essential oils are used medicinally, in food and beverages, as insecticides, for soaps, decoratively, and for many other uses (USDA 2000).

SUCCESSIONAL DYNAMICS

The *Juniperus occidentalis* ephemeral drainage plant association has been observed in various seral states. Some stands are dominated by invasive, young trees and others dominated by old growth or mature trees (Moseley 1999, Rust et al. 2000). This plant association probably represents the potential vegetation on suitable ephemeral drainage habitats in the juniper zone. *Juniperus occidentalis* is highly competitive but mostly intolerant of shade (USDA 2000). It does not invade shallow soil sites, such as those found in ephemeral drainages, as rapidly as deeper soil sites. Stands with relatively low understory fuel (such as this association) burn less frequently and are more likely to be in late-seral condition (USDA 2000). *Juniperus occidentalis* stands in ephemeral drainages that are overgrazed have decreased *Festuca idahoensis* and more *Poa bulbosa* and *Bromus japonicus* (Moseley 1999, Rust et al. 2000).

WILDLIFE FUNCTIONS

Juniperus occidentalis cone-berries are important winter food sources for migratory birds such as the American robin and Townsend's solitaire as well as resident blue grouse and Stellar's jay (USDA 2000). Other birds, such as mountain bluebird, mountain chickadee, Lewis' woodpecker, and northern flicker, nest in juniper snag cavities and feed in *Juniperus occidentalis* stands. Mule deer, elk, mountain cottontail, coyote, black-tailed jackrabbits, porcupine, small mammals, and dusky-footed woodrat also eat cone-berries and foliage (USDA 2000). *Juniperus occidentalis* also provides good cover, nesting, and hibernation sites for many birds and mammals (USDA 2000).

CLASSIFICATION COMMENTS

The *Juniperus occidentalis* ephemeral drainage plant association is tentatively classified by two plots and one community observation from the 45 Ranch Allotment in Owyhee County, Idaho (Moseley 1999). It is also known from the Juniper Mountain area in the Owyhee Mountains (Rust et al. 2000). This plant association was tentatively called *Juniperus occidentalis/Danthonia californica* by Moseley (1999). However, the diagnostic species, *Danthonia californica*, has only 60% constancy and there is high understory heterogeneity making identification of a clear understory indicator difficult (Moseley 1999, Rust et al. 2000). In fact, *Festuca idahoensis* and *Poa nevadensis* are the most dominant understory species and may be better indicators. Until additional sampling occurs, stands are treated as *Juniperus occidentalis* ephemeral drainage to reflect the ecological setting and the presence of a suite of understory species that prefer ephemerally moist sites. This plant association does include one community observation of *Juniperus occidentalis/Artemisia arbuscula* in an ephemeral drainage (Rust et al. 2000). This plant association does not include *Juniperus occidentalis/* mountain shrub dominated draws or juniper stands on riparian alluvial terraces.

Juniperus scopulorum/Elymus glaucus

Rocky Mountain juniper/blue wildrye **n=3**

RANGE

Juniperus scopulorum/Elymus glaucus is possibly a rare association. It has only been reported in the canyons of the East Fork Jarbidge River and Bruneau River of Idaho near the Nevada border (Moseley 1998, Moseley 1999). It is probably located elsewhere in tributary canyons confluent with the Bruneau and Jarbidge rivers in both Idaho and Nevada.

ENVIRONMENT

The *Juniperus scopulorum/Elymus glaucus* association is known from 4200 to 4800 feet in elevation. It is found in deep canyons trending north to northwest out of the foothills of the Jarbidge Mountains and into the Owyhee Plateau (Moseley 1999). The association is located along low gradient rivers 6 to 10 m wide, full of coarse cobbles, stones, and boulders. The rivers are entrenched, with no real floodplain below old alluvial terraces. The association is located on 5 to 10 m wide dry terraces adjacent to the river, 1.5 to 2 m above the base flow. The terraces are flat to gently sloping (to 5 degrees). Riverbank full stage is about 0.5 to 1 m below the terraces which only flood in rare, extreme events (Moseley 1999).

SOILS

Little soils information is available. This association occurs on alluvial terraces that have sandy and gravelly textures with occasional colluvial stones or boulders (less than 10% cover). Soils have low water holding capacity. Parent materials are mixed alluvium, derived predominantly from volcanic rock.

VEGETATION COMPOSITION

Juniperus scopulorum forms a nearly closed canopy with up to 90% cover in uneven-aged stands. The most common tree sizes are pole and mature trees. However, larger diameter trees and young saplings are also present. *Populus tremuloides* and *Populus trichocarpa* may also be present with low cover (Moseley 1999). There is less than 10% low shrub cover, composed of *Berberis repens, Rosa woodsii,* and *Ribes inerme.* The herbaceous layer is predominantly graminoid dominated. The most common species is *Elymus glaucus* followed by *Poa nevadensis* cover. A mix of other less common species, usually averaging less than 3% cover, include *Festuca idahoensis, Poa pratensis, Bromus tectorum*, and *Carex* spp. (*Carex lanuginosa* or *C. rossii*) (Moseley 1999). Forb cover is about 10%, dominated by *Smilacina stellata.* No other forbs are common. However, *Equisetum hyemale, Silene menziesii,* and *Clematis ligusticifolia* may be noticeable. The ground cover is 10 to 50% litter (mainly juniper needles), 10% downed wood, and 40 to 80% cryptogam cover (mainly moss) (Moseley 1999).

SPECIES	CON	COVER	MIN	MAX
TREES				
Juniperus scopulorum	100	76.7	50	90
Populus tremuloides	33	0.3	0	1
Populus trichocarpa	33	0.3	0	1
SHRUBS				
Berberis repens	67	3.7	0	10
Clematis ligusticifolia	67	4.3	0	10
Rosa woodsii	100	1.0	1	1
Toxicodendron rydbergii	33	1.0	0	3
FORBS				
Arctium sp.	33	1.0	0	3
Cirsium arvense	33	1.0	0	3
Silene menziesii	67	1.3	0	3
Smilacina stellata	100	7.7	3	10
FERNS/FERN ALLIES				
Equisetum hyemale	67	0.7	0	1
GRAMINOIDS				
Bromus tectorum	67	0.7	0	1
Elymus cinereus	67	0.7	0	1
Elymus glaucus	67	4.3	0	10
Poa nevadensis	67	2.0	0	3
Poa pratensis	67	1.3	0	3
Bromus inermis	33	3.3	0	10
Carex lanuginosa	33	0.3	0	1
Carex rossii	33	1.0	0	3
Festuca idahoensis	33	3.3	0	10
Poa secunda	33	1.0	0	3

ADJACENT COMMUNITIES

Other alluvial terrace associations adjacent to *Juniperus scopulorum/Elymus glaucus* include

Juniperus scopulorum/Equisetum spp. (Moseley 1999). Drier terraces show invasion by canyon slope upland species such as *Artemisia tridentata, Cercocarpus ledifolius, Purshia tridentata, Chrysothamnus* spp., *Festuca idahoensis, Agropyron spicatum, Elymus cinereus, Poa secunda,* and *Eriogonum* spp. Wetter terrace associations include *Populus trichocarpa* associations with high cover of *Cornus sericea, Rosa woodsii, Salix* spp., and *Ribes inerme* in the understory. Wetter streambank associations include *Salix exigua* and other *Salix* spp., *Cornus sericea*, and mesic graminoid dominated types (Moseley 1999). Adjacent upland associations are *Artemisia tridentata* ssp. *wyomingensis*-steppe with scattered *Juniperus scopulorum*, low sagebrush, and other upland shrub species.

MANAGEMENT CONSIDERATIONS

Production of livestock forage is low in the *Juniperus scopulorum/Elymus glaucus* association due to tree shading and droughty soils. Moreover, *Juniperus scopulorum* has low palatability for livestock, though seedlings can be killed by grazing (Hansen et al. 1995, Hall and Hansen 1997). *Elymus glaucus* is good early season forage but does not tolerate heavy grazing. The association may provide some logs for pencils and posts but mechanical soil damage is a likely result of harvest. Soils are droughty and structurally weak, with low organic matter, thus logging and grazing easily scarify the ground promoting invasive species such as *Bromus tectorum*. Younger *Juniperus scopulorum* trees are easily killed by fire, though older trees can survive (Hall and Hansen 1997). Fire potential, however, is low in the canyon bottom sites. *Juniperus scopulorum* is slow to invade disturbed sites since regeneration is by bird deposited seeds. *Elymus glaucus* produces abundant seed and germinates readily. Both *Juniperus scopulorum* and *Elymus glaucus* provide moderate to good erosion control and potential as long-term revegetation species (Hansen et al. 1995). The alluvial benches that support this association are usually too small for recreation or other developments. Stands occur on flat terraces and have abundant shade, making stands ideal for loafing livestock in the summer. Grazing can cause considerable damage to the duff layer making sites susceptible to weed invasion.

SUCCESSIONAL DYNAMICS

The *Juniperus scopulorum/Elymus glaucus* association possibly originated as a *Populus trichocarpa* type before river downcutting further dried the site, preventing *Populus trichocarpa* regeneration. This is evidenced by old beaver cut stumps present in some stands and lack of *Populus trichocarpa* regeneration (Moseley 1999). A similar situation was observed in early to mid-seral *Juniperus scopulorum/Cornus sericea* stands which may be dominated by *Populus* spp. or shrubs such as *Salix* spp. or *Betula occidentalis* (Hansen et al. 1995, Hall and Hansen 1997). With further downcutting of the river, the association might move toward a drier association with slow invasion by drought tolerant upland species (Hansen et al. 1995) such as *Artemisia tridentata, Cercocarpus ledifolius, Purshia tridentata, Chrysothamnus* spp., *Festuca idahoensis, Agropyron spicatum, Elymus cinereus*, and *Poa secunda*. The stand that Moseley (1998) originally called the *Juniperus scopulorum*/Mesic forb plant association is considered an early seral stage of this type. The stand was used as a loafing area by cattle, had reduced graminoid cover, and high cover of exotic or unpalatable native forbs.

WILDLIFE FUNCTIONS

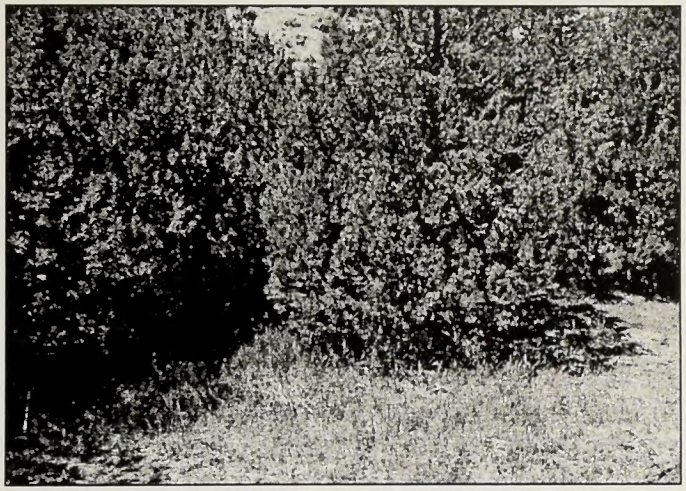
Evidence of mule deer and historic beaver use is present in the *Juniperus scopulorum/Elymus glaucus* association (Moseley 1999). Mule deer will feed on *Juniperus scopulorum* foliage and *Elymus glaucus*. Birds and small mammals will feed on *Juniperus scopulorum* berries in winter (Hansen et al. 1988). *Juniperus scopulorum* also provides excellent thermal and hiding cover for ungulates and other species (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Juniperus scopulorum/Elymus glaucus is currently undescribed in any reviewed literature. It is based on field observations and two plots (Moseley 1998, Moseley 1999). An early seral stand of this type was tentatively described by Moseley (1998) as the *Juniperus scopulorum*/Mesic forb plant association.

Juniperus scopulorum/Equisetum spp.

Rocky Mountain juniper/horsetail **n=2**



RANGE

The *Juniperus scopulorum/Equisetum* spp. plant association is known only from the East Fork Jarbidge River and a tributary to the Jarbidge River (Buck Creek) along the Idaho-Nevada border (Moseley 1999). It is expected in adjacent Nevada and downstream in the canyons of the Jarbidge and Bruneau rivers and their tributaries. Unlike *Juniperus scopulorum/Cornus sericea* known from Montana, eastern Idaho, and Colorado (Hansen et al. 1995, Hall and Hansen 1997, Reid et al. 2000), this plant association is possibly a rare entity.

ENVIRONMENT

The *Juniperus scopulorum/Equisetum* spp. plant association is found at 5,300 to 5,500 feet elevation along perennial streams cut into the foothills of the Jarbidge Mountains and neighboring volcanic plateau (Moseley 1999). The plant association is located on alluvial terraces (narrow to wide) perched 1 m to 1.5 m above the base flow of streams. Though fine sand and silt are deposited on these terraces, the terraces only flood in extreme runoff events (Moseley 1999). The streams vary from low gradient and wide (East Fork Jarbidge River) to steep gradient and narrow (Buck Creek). Streams are entrenched and choked with boulders, stones, and cobbles.

SOILS

Soils are well drained sandy-loams deposited between numerous cobbles, stones, and boulders.

VEGETATION COMPOSITION

Juniperus scopulorum forms moderately dense to very dense stands of mixed aged trees, though few seedlings are present. *Juniperus scopulorum* is 6 to 7 m tall with 60 to 80% cover (Moseley 1999). Total understory shrub cover is about 10% or less, with *Cornus sericea, Rosa woodsii, Rubus idaeus, Ribes* spp. (*R. aureum* and *R. inerme*) being the most common species. *Equisetum* spp. dominates the ground layer, with 70% cover of *Equisetum hyemale* in one plot and 50% cover of *Equisetum arvense* in the other plot (Moseley 1999). *Poa pratensis* is the only other understory species with moderate cover (30% in one plot). Other than those species, the understory is diverse but sparse. The most common forbs, all with less than 10% cover, are *Smilacina stellata, Senecio* spp. (*Senecio serra* and *S. streptanthifolius*), and *Geranium viscosissimum* (Moseley 1999). The ground is covered with large amounts of needle litter, woody debris, and moss and lichen.

SPECIES	CON	COVER	MIN	MAX
TREES				
Juniperus scopulorum	100	70	60	80
SHRUBS				
Clematis ligusticifolia	50	1.5	0	3
Cornus sericea	50	1.5	0	3
Rosa woodsii	50	1.5	0	3
Rubus idaeus	50	1.5	0	3
FORBS				
Geranium viscosissimum	100	2	1	3
Senecio serra	50	5	0	10
Senecio streptanthifolius	50	1.5	0	3
Silene menziesii	100	1	1	1
Smilacina stellata	100	5.5	1	10
FERNS/FERN ALLIES				
Equisetum arvense	50	25	0	50
Equisetum hyemale	100	35.5	1	70
GRAMINOIDS				
Carex lanuginosa	100	1	1	1
Carex rossii	100	1	1	1
Elymus cinereus	100	1	1	1
Poa pratensis	100	15.5	1	30

ADJACENT COMMUNITIES

Upland communities adjacent to *Juniperus scopulorum/Equisetum* spp. are canyon slopes dominated by *Artemisia tridentata* (ssp. *wyomingensis* or *tridentata*) with *Festuca idahoensis* or *Agropyron spicatum* understories (Moseley 1999). Patches of upland *Juniperus scopulorum* woodland are also found on canyon slopes. Adjacent riparian communities are dominated by *Populus trichocarpa* or *Salix* spp. with *Rosa woodsii* in the understory.

MANAGEMENT CONSIDERATIONS

Juniperus scopulorum is poor forage for cattle, sheep, and horses, however, seedlings can be killed by grazing (Hansen et al. 1995). Though *Juniperus scopulorum/Equisetum* spp. provides little forage for livestock, the flat terrace sites make ideal spots for livestock seeking shady loafing spots (Moseley 1999). Considerable damage to the duff layer and soil surface can occur from livestock loafing and trailing or other disturbances such as logging (Hansen et al. 1995). Since alluvial terrace soils are structurally weak, disturbances easily scarify the ground, promoting invasion by exotic weeds such as *Bromus tectorum* and *Poa pratensis*. *Juniperus scopulorum* is occasionally cut for firewood, poles, pencils, fenceposts, and other wood products. It has a wide variety of uses due to its durable, rot-resistant, and clean burning qualities (Hansen et al. 1995, USDA 2000). It is also used medicinally, as flavorings and scenting agents, and for decorative purposes. In addition, *Juniperus occidentalis* does provide moderate to good streambank erosion control. Young *Juniperus scopulorum* are easily killed by fire but older trees, with thicker bark and open crowns, are somewhat more resistant (Hall and Hansen 1997, USDA 2000). However, fire potential in riparian zones is mostly low.

SUCCESSIONAL DYNAMICS

Juniperus scopulorum can be a pioneer species in some communities while representing a climax species in others (USDA 2000). However, little information is available regarding the successional dynamics of the *Juniperus scopulorum/Equisetum* spp. plant association. One plot had an inclusion of *Artemisia tridentata* ssp. *wyomingensis/Festuca idahoensis*, possibly indicating the invasion of this community by *Juniperus scopulorum* in response to a slight raise in the water table (Moseley 1999). Alternatively, the *Juniperus scopulorum/Equisetum* spp. plant association may have formed after river down cutting dried out terraces and eliminated a prior wetter type (e.g., those dominated by *Populus trichocarpa, Cornus sericea, Salix exigua*, or other mesic species) (Hansen et al. 1995, Moseley 1999). Further down cutting may allow xeric species to invade the site.

WILDLIFE FUNCTIONS

Juniperus scopulorum provides good thermal and hiding cover for ungulates as well as other wildlife (Hansen et al. 1995). Numerous bird species, such as waxwings, wild turkeys, and other game birds, and small mammals feed on the cone-berries (USDA 2000). Elk, mule deer, bighorn sheep, and other mammals occasionally feed on *Juniperus scopulorum* foliage (Hansen et al. 1995, USDA 2000). The understory of the *Juniperus scopulorum/Equisetum* spp. plant association does not offer much forage for wildlife.

CLASSIFICATION COMMENTS

The *Juniperus scopulorum/Equisetum* spp. plant association is tentatively classified from two plots in the Jarbidge River watershed in south-central Idaho (Moseley 1999). Though *Juniperus scopulorum* dominates the riparian zones of the mid to upper Bruneau and Jarbidge rivers (and their larger tributaries), this plant association has not been extensively sampled. Further sampling may better describe this type.

Pseudotsuga menziesii/Acer glabrum-Physocarpus malvaceus floodplain

Douglas-fir/Rocky Mountain maple-mallow ninebark floodplain **n=1**

RANGE

This association is known from northeastern Oregon and adjacent Idaho.

ENVIRONMENT

This Douglas-fir association is found on streambanks, floodplains, and terraces at elevations from 2,800 to 4,400 feet. Valleys are generally moderate, high, and very high gradient (5 to 12%) and V-shaped. Valley widths vary from 3 to 200 m and have very steep side slopes. Rosgen stream types identified in Idaho and Oregon were A2, A3, A5, C3, and C4 streams. Stream widths are narrow, ranging from 1 to 5 m (Crowe and Clausnitzer 1997).

SOILS

Soils are composed of 0.5 to 1 m of silt and sandy loam over gravel, cobbles, and stones. The water table generally resides in the coarse alluvium at depths of 0.5 to 1 m (Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Stands are characterized by a *Pseudotsuga menziesii* overstory with a diverse tall shrub understory. *Acer glabrum, Philadelphus lewisii, Holodiscus discolor, Physocarpus malvaceus,* and *Amelanchier alnifolia* dominate this layer. A short shrub layer is composed of *Symphoricarpos albus, Spiraea betulifolia,* and *Rosa gymnocarpa.* A diverse herbaceous layer occurs under the dense shade of the tree and shrub canopy, but it generally has low cover. *Betula occidentalis* has been observed in a few stands, but this early seral species will eventually be eliminated by the Douglas-fir overstory (Crowe and Clausnitzer 1997).

ADJACENT COMMUNITIES

Upland associations on adjacent slopes include canyon grasslands and Douglas-fir and grand fir forest associations. Adjacent riparian associations include aspen types.

MANAGEMENT CONSIDERATIONS

Although often in rugged country, this association can be easily accessible to livestock, especially for loafing and shade. Because this association is often at the headwaters of steep-gradient drainages, every effort should be made to reduce grazing impacts to the riparian vegetation and streambanks.

SUCCESSIONAL DYNAMICS

Plant species in this association are fire-resistant and/or will resprout following fire. Bark beetles and insect defoliators may impact overstory trees stressed by recurrent drought.

WILDLIFE FUNCTIONS

These streamside sites provide important habitat for a variety of wildlife species. Shrubs and fruits are eaten by deer, elk, bear, songbirds, and grouse. Trees provide habitat for squirrels, woodpeckers, and hawks. The densely vegetated, cool bottoms are used for bedding areas, hiding cover, and thermal cover by wild ungulates (Crowe and Clausnitzer 1997).

SPECIES	CON	COVER	MIN	MAX
TREES				
Pseudotsuga menziesii	100	80	80	80
SHRUBS				
Acer glabrum	100	30	30	30
Philadelphus lewisii	100	1	1	1
Symphoricarpos albus	100	1	1	1
FORBS				
Aquilegia formosa	100	1	1	1
Asperugo procumbens	100	1	1	1
Cerastium viscosum	100	1	1	1
Circaea alpina	100	20	20	20
Descurainia sophia	100	1	1	1
Galium aparine	100	3	3	3
Lactuca serriola	100	1	1	1
Montia perfoliata	100	3	3	3
Osmorhiza chilensis	100	40	40	40
Smilacina stellata	100	10	10	10
Stellaria media	100	50	50	50
Urtica dioica	100	10	10	10
Viola glabella	100	3	3	3
GRAMINOIDS				
Elymus glaucus	100	1	1	1
Poa pratensis	100	1	1	1

CLASSIFICATION COMMENTS

The *Pseudotsuga menziesii/Acer glabrum-Physocarpus malvaceus* association was described by Johnson and Simon (1987) as a steep-slope, upland association. Crowe and Clausnitzer (1997) added "floodplain" to the name to distinguish their riparian type from the upland one.

Pseudotsuga menziesii/Cornus sericea

Douglas-fir/red-osier dogwood **n=1**

RANGE

This association in known from Montana (Hansen et al. 1995), Idaho (Hall and Hansen 1997), and Utah, where it is sometimes included in the Conifer/*Cornus sericea* association of Padgett et al. (1989).

ENVIRONMENT

This type occurs in mountains and at the edges of high valleys. Elevations range from 1200 to 2250 m (3,600 to 7,400 feet). It occurs on alluvial benches and terraces of major streams and rivers. It is also found along small streams and creeks, usually in narrow, V-shaped valleys.

SOILS

The overlying litter layer is variable and may be moderately extensive or practically non-existent depending on the particular site. The texture of soils in the upper layers range from fine sands to silts and clays. The underlying substrate is generally alluvium, composed of coarse sands, gravels, and cobbles. Large rocks may be present where this type occupies locations at the base of scree slopes. Sites tend to be well-drained due to this unconsolidated layer (Hall and Hansen 1997).

VEGETATION COMPOSITION

Stands are characterized by a *Pseudotsuga menziesii* overstory with *Populus tremuloides, Populus trichocarpa, Pinus ponderosa*, and *Juniperus scopulorum* occasionally associated as minor components. Where *Pseudotsuga menziesii* forms a dense canopy the understory is relatively sparse, and visa versa. The shrub layer is characterized by *Acer glabrum* and *Cornus sericea* as consistent members, with *Rosa woodsii* and *Prunus virginiana* also being common. The herbaceous layer is dominated by a diverse assemblage of low-growing plants, all with relatively low cover, probably due to shading by the tree and shrub canopy (Hall and Hansen 1997).

SPECIES	CON	COVER	MIN	MAX
TREES				
Pseudotsuga menziesii	100	30	30	30
SHRUBS				
Acer glabrum	100	10	10	10
Amelanchier alnifolia	100	3	3	3
Cornus sericea	100	80	80	80
Rhamnus purshiana	100	3	3	3
Ribes aureum	100	1	1	1
Rubus parviflorus	100	3	3	3
Salix scouleriana	100	1	1	1
FORBS				
Angelica arguta	100	1	1	1
Circaea alpina	100	3	3	3
Galium aparine	100	3	3	3
Geum macrophyllum	100	1	1	1
Osmorhiza chilensis	100	1	1	1
Potentilla glandulosa	100	1	1	1
FERNS/FERN ALLIES				
Cystopteris fragilis	100	1	1	1
GRAMINOIDS				
Bromus carinatus	100	1	1	1
Elymus glaucus	100	1	1	1
Glyceria elata	100	1	1	1

ADJACENT COMMUNITIES

Adjacent riparian associations include *Populus trichocarpa, Salix* spp., *Betula occidentalis, Alnus incana*, and *Populus tremuloides* types. Adjacent uplands support sagebrush-steppe, *Pseudotsuga menziesii*, and *Pinus ponderosa* types.

MANAGEMENT CONSIDERATIONS

Cornus sericea, Prunus virginiana, and *Acer glabrum* are preferentially browsed by livestock and wild ungulates and may decrease as grazing intensifies. This may leave disturbance tolerant shrubs, such as *Symphoricarpos albus* and *Rosa woodsii,* in high cover. Continued heavy grazing may cause a loss of shrubs altogether, leaving a depauperate understory of *Poa pratensis* (Hall and Hansen 1997). The streamside position of this association makes it important in providing thermal cover, debris recruitment, and streambank stability. *Cornus sericea* is an excellent shrub for controlling erosion along streambanks. This is especially important because this association is often along the headwaters of steep-gradient streams.

SUCCESSIONAL DYNAMICS

Stands of *Populus tremuloides* and a variety of shrub-dominated associations (typically *Salix* spp. and *Alnus incana)* represent seral stages of this type. *Pseudotsuga menziesii* will probably be present and successfully reproducing in the understory of these stands. Heavy, persistent livestock grazing may result in a loss of shrubs or change in shrub composition.

WILDLIFE FUNCTIONS

This association provides valuable hiding cover and shade to a variety of species. Big game use may be high, depending upon the time of year. Whitetail deer may use this type year round as cover, while other big game species may use this type as cover only in the winter. *Cornus sericea* is favored by moose and beaver (Hall and Hansen 1997).

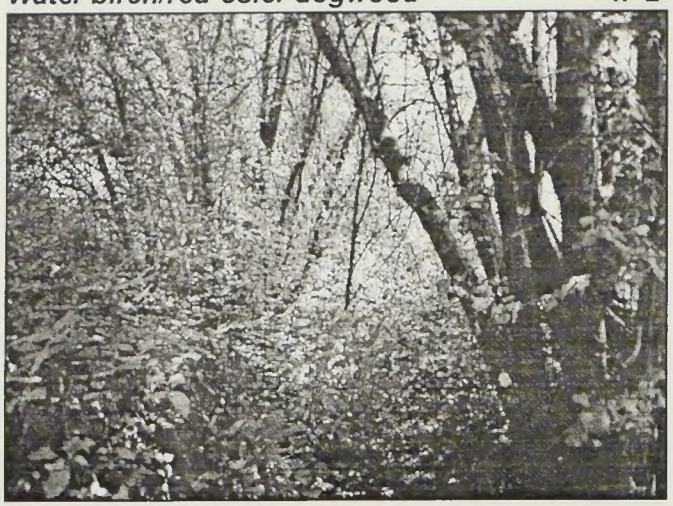
CLASSIFICATION COMMENTS

This plant association has been thoroughly sampled and described in Idaho and Montana. Padgett et al. (1989) describe a much broader Conifer/*Cornus sericea* association that includes the one described here, in addition to ones dominated by other conifers, such as *Abies lasiocarpa* and *Picea engelmannii.*

TALL SHRUB ASSOCIATIONS

Betula occidentalis/Cornus sericea

Water birch/red-osier dogwood **n=2**



RANGE

The plant association is known from Montana and eastern Washington, south to Idaho, into Utah, and Nevada.

ENVIRONMENT

Betula occidentalis/Cornus sericea is found at elevations ranging from 2,100 to 7,500 feet. It occurs on gently sloping streambanks and terraces of moderate to high gradient mountain and foothill streams. The surface topography of sites is often undulating (Padgett et al. 1989, Manning and Padgett 1995).

SOILS

Soils are alluvial and textures are coarse to fine, ranging from loamy-skeletal and fine-loamy over sandy-skeletal, to coarse-loamy. Water tables were typically below the depth of the soil pit (Padgett et al. 1989, Manning and Padgett 1995).

VEGETATION COMPOSITION

Betula occidentalis clearly dominates the tall shrub overstory with over 30% cover. The undergrowth is characterized by shrub thickets dominated by *Cornus sericea*. *Rosa woodsii* and tall *Salix* spp. are frequently present with up to 15% cover. In southwest Idaho stands, *Philadelphus lewisii* was present in both plots with 10% cover. The herbaceous layer varies inversely with the shrub layer. Herbaceous species that are consistently present include *Smilacina stellata, Equisetum* spp., *Galium triflorum, Elymus glaucus,* and *Poa pratensis.*

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by *Pseudotsuga menziesii, Pinus edulis, Juniperus osteosperma, Pinus ponderosa, Quercus gambellii, Artemisia tridentata*, and/or *Cercocarpus ledifolius.* Adjacent riparian associations include those dominated by various *Populus* spp. (Padgett et al. 1989, Manning and Padgett 1995).

MANAGEMENT CONSIDERATIONS

This association is important for streambank stabilization. Livestock use is typically impeded due to the dense shrub layer formed by *Cornus sericea* (Manning and Padgett 1995).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Alnus incana	50	10	0	20
Betula occidentalis	100	85	80	90
Clematis ligusticifolia	50	0.5	0	1
Cornus sericea	100	25	20	30
Philadelphus lewisii	100	10	10	10
Prunus virginiana	50	0.5	0	1
Rubus idaeus	50	0.5	0	1
Rubus parviflorus	50	1.5	0	3
Salix lasiandra var. caudata	50	10	0	20
Symphoricarpos albus	50	0.5	0	1
Toxicodendron rydbergii	50	0.5	0	1
FORBS				
Circaea alpina	50	0.5	0	1
Epilobium ciliatum	50	0.5	0	1
Galium aparine	50	0.5	0	1
Heracleum lanatum	50	0.5	0	1
Osmorhiza chilensis	50	0.5	0	1
Rumex crispus	50	0.5	0	1
Smilacina racemosa	50	0.5	0	1
Smilacina stellata	50	1.5	0	3
Trillium petiolatum	50	0.5	0	1
Urtica dioica	50	0.5	0	1
Veronica anagallis-aquatica	50	0.5	0	1
FERNS/FERN ALLIES				
Equisetum hyemale	50	0.5	0	1
GRAMINOIDS				
Elymus glaucus	100	1	1	1

SUCCESSIONAL DYNAMICS

Pseudotsuga menziesii, Picea pungens, and *Abies lasiocarpa* are present in minor amounts in some

communities, which may result in the eventual replacement of this type by the Conifer/*Cornus sericea* plant association. In some stands *Populus tremuloides, P. angustifolia,* or *Acer negundo* may indicate succession toward associations dominated by these species with understories of *Cornus sericea* (Padgett et al. 1989, Manning and Padgett 1995). Manning and Padgett (1995) note that overstory and undergrowth dominants are well adapted to sites in Nevada. This may be a long-lived type which may survive until channel incision and/or lateral migration occurs.

WILDLIFE FUNCTIONS

Streams lined with stands of this association provide shade, travel corridors, and hiding cover for a variety of wildlife species. *Betula occidentalis* is usually only lightly browsed unless other forage is not available. *Cornus sericea* provides food and cover for mule deer, moose, elk, mountain goats, cottontail rabbits, snowshoe hares, and many birds. The fruits are an important black bear food and are also eaten by songbirds, grouse, quail, partridge, cutthroat trout, ducks, crows, mice, and other mammals. The young stems and bark are eaten by deer mice, meadow voles, and other small rodents. Beaver may use both of the diagnostic shrubs for food and building materials (Crowe and Clausnitzer 1997, Hansen et al. 1995).

CLASSIFICATION COMMENTS

This is a well-documented type with classification based on 9 stands in Nevada (Manning and Padgett 1995), 14 stands in Utah and southeastern Idaho (Padgett et al. 1989), and an unknown number of stands in Montana (Hansen et al. 1995) and Washington (Evans 1989).

Betula occidentalis/Mesic forb

Water birch/Mesic forb n=2

RANGE

The *Betula occidentalis*/Mesic forb plant association is of minor occurrence throughout the western United States in Colorado, Nevada, California, Oregon, Idaho, and Utah.

ENVIRONMENT

The *Betula occidentalis*/Mesic forb plant association occurs on terraces and floodplains in narrow to moderately wide valleys. Stands may be well developed extending away from the channel edge or stringers that are confined to the channel edge where the valley wall meets the stream. Stands may also occur in association with seeps and spring fed channels (Padgett et al. 1989, Kittel et al. 1999).

SOILS

Shallow soils are formed in alluvium with mottles common within 50 cm of the soil surface indicating a seasonally high water table (Padgett et al. 1989, Kittel et al. 1999). Soils are very shallow and poorly developed over boulders in stands occurring in narrow, high gradient valleys.

VEGETATION COMPOSITION

Betula occidentalis clearly dominates the tall shrub overstory with 30 to nearly 100% cover. The undergrowth is characterized by mixed forbs with *Heracleum lanatum, Geranium richardsonii, Equisetum arvense, Aconitum columbianum, Chamerion angustifolium, Smilacina stellata* and other forbs with over 100% cover in combination. *Aquilegia formosa* is conspicuously present with up to 30% cover in Idaho stands that are associated with springs along the middle Snake River. A somewhat sparse low shrub layer is often present and may include *Rosa woodsii, Salix* spp., or *Cornus sericea*. Graminoids may be absent or *Carex microptera, Glyceria elata, Agrostis stolonifera*, and *Poa pratensis* may contribute a combined cover of up to 25%.

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Acer glabrum	50	5	0	10
Betula occidentalis	100	94	90	98
Clematis ligusticifolia	100	5.5	1	10
Cornus sericea	50	5	0	10
Crataegus douglasii	50	5	0	10
Rosa woodsii	50	1.5	0	3
Toxicodendron radicans	50	20	0	40
FORBS				
Galium aparine	50	1.5	0	3
Osmorhiza chilensis	50	5	0	10
Smilacina stellata	100	15	10	20
Urtica dioica	100	1	1	1
Verbascum thapsus	100	1	1	1
GRAMINOIDS				
Elymus glaucus	100	2	1	3
Poa pratensis	50	5	0	10

ADJACENT COMMUNITIES

Adjacent upland associations include forests dominated by *Abies concolor, Pinus ponderosa,* and *Pinus edulis, Agropyron-Festuca* grasslands, or *Artemisia*-steppe vegetation. Adjacent riparian associations include those dominated by *Populus tremuloides, Rosa woodsii*, and/or various tall willows (Padgett et al. 1989, Manning and Padgett 1995, Moseley 1998).

MANAGEMENT CONSIDERATIONS

This plant association is open and lacks a dense low shrub layer. Livestock are likely to use this association for forage and shade. Early season grazing should be avoided to increase vigor of the dominant shrub. The coarse textured soils are generally erodible and livestock use should be managed to avoid streambank damage. Shoots of water birch are killed by fire, but plants will resprout from uninjured basal buds (Youngblood et al. 1985, Hansen et al. 1995). The species is useful for revegetating disturbed sites. Seedlings that are one to two years old do well when planted in moist sites in the spring. Direct seeding has limited success. Once established the species is an effective streambank stabilizer (USDA 2000).

SUCCESSIONAL DYNAMICS

The presence of *Pinus ponderosa, Picea engelmannii,* and *Populus tremuloides*, among others, indicates a possible successional trend toward coniferous tree-dominated associations (Padgett et al. 1989). Manning and Padgett (1995) suggest the *Betula occidentalis*/Mesic forb association may represent good ecological condition, particularly when species such as *Aconitum columbianum* or *Smilacina stellata* are undergrowth dominants. Through heavy grazing, however, the type may be replaced by the *Betula occidentalis/Poa pratensis* association (Padgett et al. 1989, Moseley 1998).

WILDLIFE FUNCTIONS

Betula occidentalis associations frequently occur as stringers along streams that provide migration routes, hiding cover, and shade for both large and small mammals. Water birch is not an important browse species for big game animals, but use will occur if other woody species are not available (Hansen et al. 1995). The catkins, buds, and seeds of water birch are eaten by sharp-tailed grouse, spruce grouse, ruffed grouse, redpolls, pine siskin, chickadees, and kinglets. Sap oozing from holes is feed for hummingbirds and red-naped sapsuckers. Plants that overhang streambanks provide shade and organic matter that benefit fish habitat (USDA 2000).

CLASSIFICATION COMMENTS

This plant association has been recognized in several studies from throughout the Intermountain West and Rocky Mountains (Padgett et al. 1989, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Moseley 1998, Kittel et al. 1999).

Betula occidentalis/Philadelphus lewisii

Water birch/syringa **n=1**

RANGE

The *Betula occidentalis/Philadelphus lewisii* plant association is known from the Blue Mountains, Columbia Basin, High Lava Plains, and Owyhee Uplands of eastern Oregon (Oregon Natural Heritage Program 1999). One stand has been sampled in southeastern Washington (Crawford 2000). It has also been sampled at Jump Creek, in the foothills of the Owyhee Mountains (Moseley 1998). The association is expected to occur in other canyons on the Owyhee Front, in the Hells Canyon region, and in other low elevation sites of southwest Idaho.

ENVIRONMENT

The *Betula occidentalis/Philadelphus lewisii* plant association is found on active floodplains and alluvial terraces of low elevation (2,080 to 3,360 feet), low gradient streams (Moseley 1998, Oregon Natural Heritage Program 1999, Crawford 2000). It is observed along both small, intermittent streams (Crawford 2000) and large perennial streams (e.g., orders 3 and 4) (Oregon Natural Heritage Program 1999). In Idaho, the association was sampled in the floodplain of a four m wide, 4% gradient stream (Moseley 1998). This stream cuts a deep canyon into rhyolitic bedrock and is subject to high spring runoff and flash floods (e.g., January 1997). As a result of intense flood scouring and deposition, large amounts of rock and gravel are exposed (Moseley 1998).

SOILS

Betula occidentalis stands are typically found on coarse textured, gravelly sandy-loam soils (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crawford 2000).

VEGETATION COMPOSITION

Betula occidentalis forms a tree-like canopy (about 8 to 11 m tall), often completely shading the stream with cover ranging from 20 to 98% (Moseley 1998, Oregon Natural Heritage Program 1999, Crawford 2000). *Philadelphus lewisii* is the most prominent understory species with an average cover of 28% in Oregon plots. *Toxicodendron rydbergii* can sometimes dominate the ground layer (with cover up to 20%) and *Rosa woodsii* is often present but with low cover (Moseley 1998, Oregon Natural Heritage Program 1999, Crawford 2000). In Oregon stands, *Cornus sericea* and *Ribes aureum,* as well as the climbing vine *Clematis ligusticifolia,* are sometimes present with low to moderate cover. The herbaceous understory is sparse and low in diversity due to shading and flood scouring (Moseley 1998). The most commonly occurring graminoids, all with low cover, are *Elymus glaucus, Poa pratensis,* and *Bromus tectorum* (Moseley 1998, Oregon Natural Heritage Program 1999). The only prominent forbs are the weedy exotic *Solanum dulcamara* and occasional stems of *Osmorhiza chilensis* or *Urtica dioica* (Moseley 1998, Oregon Natural Heritage Program 1999, Crawford 2000). Other forbs, indicative of disturbed soils (e.g., *Cynoglossum officinale, Verbascum thapsus,* and *Cirsium arvense*) may be present with low cover.

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Betula occidentalis	100	98	98	98
Philadelphus lewisii	100	20	20	20
Rosa woodsii	100	1	1	1
Toxicodendron rydbergii	100	20	20	20
FORBS				
Apocynum cannabinum	100	1	1	1
Cirsium arvense	100	1	1	1
Solanum dulcamara	100	1	1	1
GRAMINOIDS				
Carex amplifolia	100	1	1	1
Elymus glaucus	100	3	3	3
Glyceria elata	100	1	1	1

ADJACENT COMMUNITIES

Riparian communities adjacent to the *Betula occidentalis/Philadelphus lewisii* plant association include *Philadelphus lewisii* Intermittently Flooded Shrubland (Moseley 1998). Adjacent canyon slopes tend to be dominated by *Artemisia tridentata*/ bunchgrass steppe types.

MANAGEMENT CONSIDERATIONS

Both *Betula occidentalis* and *Philadelphus lewisii* are considered poor forage for livestock but are occasionally browsed by cattle in riparian zones (Hansen et al. 1995, USDA 2000). The palatability of new shoots is much better. The effects of heavy cattle use on *Philadelphus lewisii* persistence is not known. However, soil disturbance by cattle promotes the invasion of weedy exotic species, such as *Poa pratensis*, and causes streambank erosion (Hansen et al. 1995). Wildfires are uncommon in riparian settings; however, both *Betula occidentalis* and *Philadelphus lewisii* readily re-sprout after fire (Hansen et al. 1995, USDA 2000). The *Betula occidentalis/Philadelphus lewisii* plant association is very resistant to flooding and may even require occasional flood disturbance to persist. Due to its spreading root masses, *Betula occidentalis* and *Philadelphus lewisii* are good long-term streambank stabilizers and can be used for restoration (Hansen et al. 1995, USDA 2000). Their root masses act to decrease erosional energy and increase deposition during peak runoff periods (Padgett and Manning 1989). In addition, the dense thicket formed by the *Betula occidentalis/ Philadelphus lewisii* plant association limits livestock and human trailing, further protecting fragile streambanks (USDA 2000). *Philadelphus lewisii* is very sensitive to herbicides; thus, chemical weed control should be limited in this plant association (USDA 2000). Native Americans use *Philadelphus lewisii* branches for making a wide variety of tools and implements.

SUCCESSIONAL DYNAMICS

Information is lacking regarding the successional dynamics of the *Betula occidentalis/Philadelphus lewisii* plant association. *Betula occidentalis* and *Philadelphus lewisii* are both adapted to various levels of disturbance (e.g., flood scouring) (Hansen et al. 1995, Moseley 1998, USDA 2000). They are prolific seed producers and shoot production from roots is high. They are considered early seral species but form stable, persistent communities on many sites (Manning and Padgett 1995, USDA 2000). Crawford (2000) suggests that the *Betula occidentalis/Philadelphus lewisii* plant association is a later seral stage of *Populus trichocarpa/ Philadelphus lewisii* or *Alnus rhombifolia/ Philadelphus lewisii* associations. The *Betula occidentalis/Philadelphus lewisii* plant association may be maintained by periodic flood scouring (Moseley 1998). Deposition of fine alluvium and stream down cutting (less flood scouring) may promote other *Betula occidentalis* associations with better developed herbaceous understories (e.g., mesic graminoid, mesic forb, *Equisetum* spp., etc.) or drier types (Padgett et al. 1989, Manning and Padgett 1995). Excessive livestock use of this plant association may promote invasion by *Rosa woodsii, Poa pratensis*, and exotic weedy forbs.

WILDLIFE FUNCTIONS

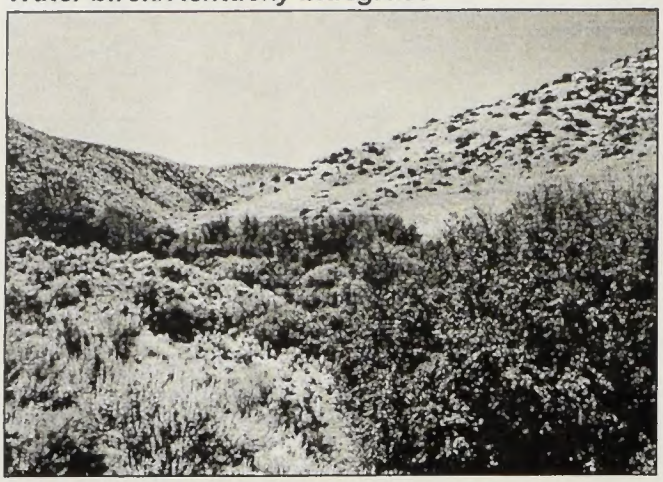
The *Betula occidentalis/Philadelphus lewisii* plant association provides excellent thermal and protective cover for elk, deer, game birds, small mammals, and songbirds (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, USDA 2000). *Philadelphus lewisii* is moderately important winter forage for wild ungulates, especially deer and elk. Quail and squirrels eat *Philadelphus lewisii* seeds (USDA 2000). The dense canopy and overhanging rootwads of *Betula occidentalis* and *Philadelphus lewisii* provide excellent stream shading and cover for salmonids (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, USDA 2000).

CLASSIFICATION COMMENTS

The *Betula occidentalis/Philadelphus lewisii* plant association is described from a limited number of plots (eight in eastern Oregon, one in southeastern Washington, one in southwest Idaho) (Moseley 1998, Oregon Natural Heritage Program 1999, Crawford 2000). However, it is distinctive and confidently classified. There are numerous other *Betula occidentalis* dominated communities (e.g., Padgett et al. 1989, Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997, Manning and Padgett 1995) but none have notable *Philadelphus lewisii*. Stands in eastern Oregon are classified as *Betula occidentalis- Philadelphus lewisii/ Clematis ligusticifolia,* due to the high constancy of *Clematis ligusticifolia* (Oregon Natural Heritage Program 1999), but this type is considered equivalent to the *Betula occidentalis/Philadelphus lewisii* plant association. Further sampling may better describe this type.

Betula occidentalis/Poa pratensis

Water birch/Kentucky bluegrass **n=1**



RANGE

Stands are known from Nevada, Utah, and central and southern Idaho (Padgett et al. 1989, Manning and Padgett 1995, Mancuso 1997).

ENVIRONMENT

The community type occupies stream terraces and occasionally seeps in narrow (rarely moderate) valley bottoms. Valley bottom gradient is typically low to moderate. Elevations of stands in Nevada, Utah, and southeastern Idaho are 6,000 to 7,800 feet while a stand in southwestern Idaho occurred at 3,200 feet. Depth to water table is generally greater than the depth of the soil pit in sampled stands (Padgett et al. 1989, Manning and Padgett 1995).

SOILS

Soil development appears to be highly variable, though all were alluvial. Estimated available water-holding capacity ranged from low to high. Depth to water table was usually below the depth of the soil pit, but was measured as high as 20 cm below the surface.

VEGETATION COMPOSITION

Betula occidentalis dominates the tall shrub overstory with minor amounts of *Salix boothii, S. lasiolepis, S. bebbiana,* and/or *S. amygdaloides. Alnus incana,* when present, is clearly subordinate. *Juniperus scopulorum* may also be present. Shrubs are common and *Rosa woodsii, Ribes aureum, R. inerme*, and *Cornus sericea* are those most likely to occur. The open undergrowth is commonly dominated by native and non-native rhizomatous graminoids, especially *Poa pratensis*. Tall forbs are inconspicuous, while low-growing weedy species may have high cover (Padgett et al. 1989, Manning and Padgett 1995).

ADJACENT COMMUNITIES

Adjacent uplands are typically dominated by pinyon-juniper communities in Nevada and Utah, although *Pinus ponderosa* and *Quercus gambelii* can also occur on adjacent slopes in Utah (Padgett et al. 1989, Manning and Padgett 1995). In southwestern Idaho, adjacent slopes are *Artemisia tridentata* ssp. *vaseyana* associations.

MANAGEMENT CONSIDERATIONS

Because of the open structure of the community type, livestock are more likely to graze and seek shade in this type than adjacent riparian types with dense understories. The result is a risk to streambank stability because of trampling. There is less structural diversity in this type than in any of the other *Betula occidentalis* associations, although it is still capable of providing shade for adjacent stream channels (Padgett et al. 1989).

SUCCESSIONAL DYNAMICS

The *Betula occidentalis/Poa pratensis* community type is likely a grazing induced seral stage of the *Betula occidentalis*/Mesic forb type. It differs from the mesic forb type in the lack of a dense forb layer. The undergrowth is open and dominated by species which indicate heavy past grazing, such as *Poa pratensis, Taraxacum officinale,* and/or *Achillea millefolium*. Otherwise, these two associations occupy similar sites (Padgett et al. 1989, Manning and Padgett 1995).

WILDLIFE FUNCTIONS

Betula occidentalis stands frequently occur as stringers along streams that provide migration routes, hiding cover, and shade for both large and small mammals. Water birch is not an important browse species, but use will occur if other woody species are not available. The structure of stands provides important habitat for birds (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Classification is based on seven plots in Utah and southeastern Idaho (Padgett et al. 1989), six plots in central Nevada (Manning and Padgett 1995), and one plot in southwestern Idaho.

Crataegus douglasii/Rosa woodsii

Black hawthorn/Wood's rose **n=7**

RANGE

The *Crataegus douglasii/Rosa woodsii* association may have formerly been widespread in eastern Oregon and Washington. It is primarily in the Columbia Basin and the Blue Mountains of southeastern Washington, northeastern Oregon, and west-central Idaho. Now it is limited to just a few scattered occurrences in this range (Grossman et al. 1994).

ENVIRONMENT

This association is found on riparian sites along low elevation, low to moderate gradient streams. Stream type is variable and includes intermittent, perennial, and spring fed streams. In Idaho, stands are present in drainage bottoms of small tributaries to larger streams in shallow, open valleys (Moseley 1998). Washington stands were reported in narrow canyons (Crawford 1999). These sites occasionally flood seasonally, but due to the low gradients they are rarely scoured.

SOILS

Detailed soil survey information is not available. Available information indicates soils are widely variable and include both deep, fine-textured soils (Kovalchik 1987) and well drained, coarse textured soils (Crawford 1999).

VEGETATION COMPOSITION

This association is composed of a partially closed canopy of the broad-leaved, deciduous tall shrub *Crataegus douglasii*. Occasional individuals of the broad-leaved deciduous trees and tall shrubs *Populus tremuloides, P. trichocarpa, Salix lasiolepis, Betula occidentalis,* or *Alnus incana* may occur, but they never dominate the stand. A broad-leaved, deciduous short shrub layer is present, with varying amounts of cover. Common species include *Prunus virginiana, Rosa woodsii, Ribes aureum, Symphoricarpos albus, Salix exigua,* and *Amelanchier alnifolia*. The herbaceous layer is composed of perennial grasses, such as *Elymus cinereus, Deschampsia cespitosa,* and *Elymus glaucus* along with the forbs *Smilacina stellata, Galium aparine,* and *Urtica dioica*.

ADJACENT COMMUNITIES

Adjacent riparian vegetation may include stands of *Salix amygdaloides, Salix lutea,* or *Salix exigua*. Uplands are mostly dominated by *Artemisia tridentata* stands.

MANAGEMENT CONSIDERATIONS

Forage production is moderate in stands of *Crataegus douglasii*. However, stands may be so dense as to preclude most livestock use. Livestock will, however, readily eat foliage when it is accessible and it has been found to be moderately palatable to livestock. Stems less that 1 m tall are preferred. *Crataegus douglasii* is an excellent soil and streambank stabilizer. Seedling establishment, however, is difficult, and growth rates are slow. The use of transplanted nursery stock is recommended (USDA 2000).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Crataegus douglasii	100	66.9	10	98
Philadelphus lewisii	43	3.0	0	10
Prunus virginiana	43	1.0	0	3
Ribes aureum	57	1.4	0	3
Rosa woodsii	86	8.0	0	20
Salix lasiolepis	57	10.4	0	30
FORBS				
Achillea millefolium	100	1.3	1	3
Collomia grandiflora	43	0.4	0	1
Medicago lupulina	57	1.1	0	3
Melilotus officinalis	57	1.4	0	3
Mentha arvensis	43	0.4	0	1
Onopordum acanthium	43	0.4	0	1
Osmorhiza chilensis	71	2.6	0	10
Rumex crispus	57	0.6	0	1
Taraxacum officinale	86	1.4	0	3
Tragopogon dubius	43	0.4	0	1
Urtica dioica	43	0.4	0	1
Verbascum thapsus	57	0.6	0	1
FERNS/FERN ALLIES				
Equisetum arvense	14	1.4	0	10
GRAMINOIDS				
Poa pratensis	100	8.9	3	20
Elymus glaucus	86	14.0	0	60
Poa bulbosa	43	5.9	0	20
Scirpus microcarpus	29	1.6	0	10

SUCCESSIONAL DYNAMICS

The successional status of the *Crataegus douglasii/Rosa woodsii* plant association is not clear. Hansen et al. (1995) indicates that the *Crataegus succulenta* dominance type (which includes stands of *Crataegus douglasii*) is a mid-seral grazing disclimax and may be seral to stands dominated by *Fraxinus pennsylvanica, Acer negundo, Populus tremuloides,* and *Pinus ponderosa*. However, the

Fire Effects Informations System indicates that *Crataegus douglasii* does not occupy disturbed sites and disturbance from fire, agricultural cropping, or flooding seems to inhibit reproduction. (USDA 2000).

WILDLIFE FUNCTIONS

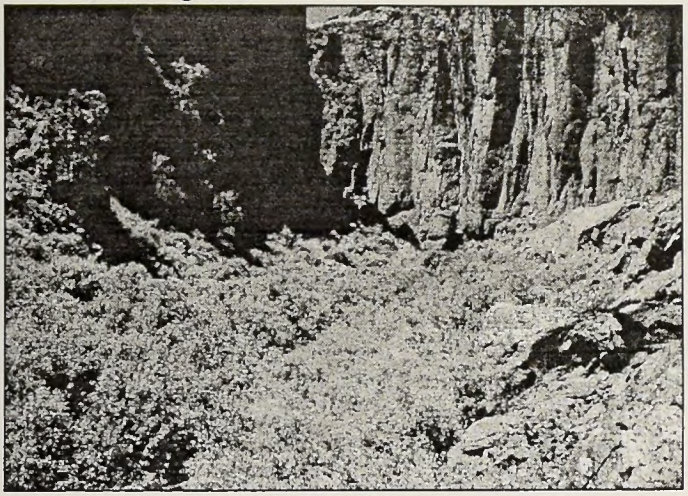
Stands of *Crataegus douglasii/Rosa woodsii* provide hiding and thermal cover and an abundance of food for a variety of wildlife. Forage production is usually low from black hawthorn thickets. Dried fruits of both *Crataegus* and *Rosa* provide autumn food for birds such as blue and sharp-tailed grouse. Mule deer and small mammals may also consume dry fruits (USDA 2000).

CLASSIFICATION COMMENTS

This plant association has been reported from Idaho, Washington, and Oregon (Reid et al. 2000), but it has very little documentation. Kovalchik (1987) includes it as an incidental association but has little information on stand structure and composition. This association was documented with plot data in 1999 in Washington (Crawford 1999) and Idaho (Moseley 1999). A *Crataegus succulenta* dominance type is described in Montana that includes all combinations of *Crataegus succulenta* and *Crataegus douglasii*. The Montana stands have *Rosa woodsii* in half of the 22 stands that were sampled (Hansen et al. 1995).

Cornus sericea

Red-osier dogwood **n=3**



RANGE

This is a widespread type known from Washington, Oregon, Idaho, Nevada, and Montana.

ENVIRONMENT

This type is typically adjacent to stream and river channels, but it can occupy a diversity of landforms. It may appear as dense linear bands on alluvial benches in narrow canyons or broad thickets on islands and floodplains of major streams and rivers. Most occurrences have evidence of annual or near-annual flooding (Manning and Padgett 1995, Hall and Hansen 1997).

SOILS

Soils of this association are classified as Inceptisols, Entisols, or Mollisols. Where sites are located outside of the active floodplain, a litter/duff layer 5 cm or more thick may accumulate. Surface horizons are comprised of a wide range of alluvial materials with textures ranging from silty clays to sandy loams. These layers may be relatively shallow or as deep as 2.5 m Underlying layers are typically coarse sands, gravels, and cobbles that facilitate the movement of aerated groundwater through the subsurface layers. This may be important for the longevity of stands. Water availability ranges from high, where this type occupies floodplains immediately adjacent to active channels, to low on upper, remote floodplain sites. Mottled and gleyed soils may occur (Manning and Padgett 1995, Hall and Hansen 1997, Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Cornus sericea forms a dense, closed canopy, often excluding understory shrub and herbaceous species. *Cornus sericea* is usually the only species with high cover values. Associated species vary with geography and elevation, but constant shrubs include *Rosa woodsii, Ribes hudsonianum, Acer glabrum, Salix exigua, S. lutea*, and *Clematis ligusticifolia*. Because of its wide range, a great diversity of herbaceous species can occur in this association, usually in low cover (Manning and Padgett 1995, Hansen et al. 1995, Hall and Hansen 1997, Crowe and Clausnitzer 1997).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Clematis ligusticifolia	67	13.7	0	40
Cornus sericea	100	92.0	80	98
Ribes aureum	67	0.7	0	1
Rosa woodsii	100	7.0	1	10
Toxicodendron rydbergii	33	1.0	0	3
FORBS				
Cirsium arvense	67	0.7	0	1
Geum macrophyllum	67	0.7	0	1
Urtica dioica	100	1.7	1	3
FERNS/FERN ALLIES				
Equisetum laevigatum	33	0.3	0	1

ADJACENT COMMUNITIES

Because of the wide geographic range for this type, associations of adjacent uplands can be coniferous forest, aspen, sagebrush-steppe, and pinyon-juniper types.

MANAGEMENT CONSIDERATIONS

The herbaceous biomass varies widely and is largely dependent on the density of the dogwood canopy (Crowe and Clausnitzer 1997). Palatability ratings for *Cornus sericea* range from low (Manning and Padgett 1995, Crowe and Clausnitzer 1997) to "ice cream" (Hansen et al. 1995, Hall and Hansen 1997). However, the stands are often so dense that they limit grazing. This community functions in a variety of ways to promote stream health. *Cornus sericea* forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme summer temperature fluctuations (Hall and Hansen 1997). Red-osier dogwood sprouts vigorously after a fire and germination of its seed bank is stimulated by fire (Crowe and Clausnitzer 1997).

SUCCESSIONAL DYNAMICS

This is considered an early seral association, typically colonizing sites adjacent to streams. The herbaceous cover is often sparse, probably due to the dense overstory canopy and regular flooding, scouring, and deposition. Regular flooding is probably responsible for maintaining this as a persistent plant association on the landscape. The presence of tall shrubs or trees in some stands may represent succession toward *Alnus incana, Populus trichocarpa, P. tremuloides, P. angustifolia, Picea engelmannii, Pseudotsuga menziesii,* or other associations.

WILDLIFE FUNCTIONS

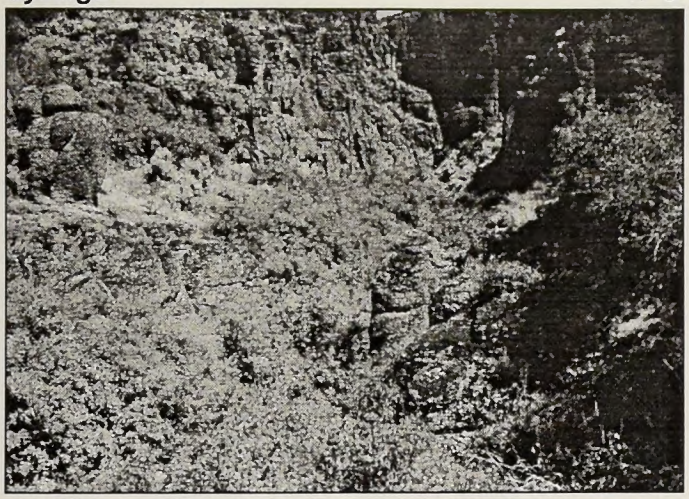
Red-osier dogwood provides food and cover for mule deer, moose, elk, mountain goats, cottontail rabbits, snowshoe hares, and many birds. The fruits are an important black bear food and are eaten by songbirds, grouse, quail, partridge, cutthroat trout, ducks, crows, mice, and other mammals. The young stems and bark are eaten by deer mice, meadow voles, and other small rodents. Red-osier dogwood often grows in dense thickets because of its layering ability. These thickets provide good mule deer fawning and rearing areas as well as nesting habitat for many songbirds (Hansen et al. 1995, Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

Stands of *Cornus sericea* have been sampled in Washington, Oregon, Idaho, Nevada, and Montana. *Cornus sericea* is the dominant species in several associations and several classifications have treated stands as a *Cornus sericea* dominance type. The *Cornus sericea* association described here lacks structural diversity of the other types due to shading and scouring, and understory species with high constancy or fidelity are lacking. This association seems most closely related to the *Cornus sericea/Galium triflorum* association described from Utah and eastern Idaho (Youngblood et al. 1985, Padgett et al. 1989).

Philadelphus lewisii

Syringa n=3



RANGE

The *Philadelphus lewisii* plant association is known from southwest Idaho (Moseley 1998), eastern Oregon, and the Columbia Basin of eastern Washington (Evans 1989, Reid et al. 2000). In Idaho it is known from the Rocking M Ranch Wildlife Conservation Easement Area in southern Hells Canyon near Brownlee Reservoir (and is expected from adjacent Oregon) (Idaho Conservation Data Center 1998). It is also described from the Jump Creek Research Natural Area on the Owyhee front (Moseley 1998). The association has not been observed elsewhere in the Owyhee region.

ENVIRONMENT

In Idaho, the *Philadelphus lewisii* plant association is found at low elevations (3,240 to 4,
200 feet) along narrow streams (about 1-2 m wide) (Idaho Conservation Data Center 1998, Moseley 1998). Typical fluvial settings for this plant association are narrow alluvial terraces or steep banks of moderate gradient streams (e.g., up to 8%) in V-shaped gorges. These sites have narrow floodplains that are occasionally scoured by flash floods or high flow events (but not every year) (Idaho Conservation Data Center 1998, Moseley 1998).

SOILS

Philadelphus lewisii prefers well-drained soils ranging from deep silt-loams to rocky/gravelly loams (Crawford 2000, USDA 2000). A large amount of exposed rock, gravel, and soil (in the same proportion as surface litter) is typical in the understory of *Philadelphus lewisii* stands (Idaho Conservation Data Center 1998, Moseley 1998, Crawford 2000).

SPECIES	CON.	COVER	MIN	MAX
TREES				
Salix amygdaloides	33	1.0	0	3
SHRUBS				
Acer glabrum	33	6.7	0	20
Clematis ligusticifolia	100	1.0	1	1
Cornus sericea	67	21.0	0	60
Crataegus columbiana	33	10.0	0	30
Philadelphus lewisii	100	66.7	50	80
Prunus virginiana	67	20.0	0	40
FORBS				
Epilobium brachycarpum	67	0.7	0	1
Epilobium ciliatum	67	0.7	0	1
Galium aparine	67	1.3	0	3
Montia perfoliata	67	7.7	0	20
Onopordum acanthium	67	1.3	0	3
Osmorhiza chilensis	67	1.3	0	3
Stellaria media	67	3.7	0	10
Urtica dioica	67	2.0	0	3
Veronica biloba	67	0.7	0	1
Asperugo procumbens	33	1.0	0	3
GRAMINOIDS				
Poa bulbosa	33	6.7	0	20
Poa pratensis	33	1.0	0	3

VEGETATION COMPOSITION

In Idaho, the *Philadelphus lewisii* plant association forms a dense tall shrub thicket. *Philadelphus lewisii* dominates these thickets with 50-80% cover, but various other tall-shrubs (sometimes up to 5 m) are always associated with high cover (Idaho Conservation Data Center 1998, Moseley 1998). For example, on the Owyhee front *Cornus sericea* is sub-dominant with *Philadelphus lewisii.* In southern Hells Canyon *Prunus virginiana, Acer glabrum,* and *Crataegus columbiana* can form a sub-dominant group with combined cover up to 70%. *Clematis ligusticifolia* is always present climbing through the shrubs. Total understory herbaceous cover varies from sparse to moderate and is inversely related to total shrub canopy cover. Stands disturbed by livestock and flooding have moderate cover of invasive exotic graminoids, such as *Poa pratensis* and *Poa bulbosa,* and numerous short-lived weeds including *Montia perfoliata* (most common), *Stellaria media* (also common), *Onopordum acanthium, Sisymbrium altissimum, Asperugo procumbens,* and others (Idaho Conservation Data Center 1998). A diverse array of native annual forbs and other herbs are usually present with low cover. The most

common are *Urtica dioica, Osmorhiza chilensis, Epilobium watsonii, Galium aparine, Epilobium paniculatum, Elymus glaucus,* annual *Bromus* spp., and *Nemophila* spp. (Idaho Conservation Data Center 1998, Moseley 1998). Moss cover is minimal.

ADJACENT COMMUNITIES

Communities adjacent to the *Philadelphus lewisii* association tend to be upland types (usually *Artemisia tridentata*/bunchgrass-*Bromus tectorum* steppe or *Physocarpus malvaceus* mountain shrub) (Idaho Conservation Data Center 1998, Moseley 1998). Neighboring riparian communities are dominated by *Crataegus douglasii, Cornus sericea, Salix* spp., or other shrubs, or by trees such as *Populus trichocarpa.*

MANAGEMENT CONSIDERATIONS

Philadelphus lewisii is considered poor forage for livestock but is sometimes heavily browsed by cattle in riparian zones (USDA 2000). New shoots are the most palatable. The effects of heavy cattle use on *Philadelphus lewisii* persistence is not known. However, soil disturbance by cattle promotes the invasion of weedy exotic species in this association (Idaho Conservation Data Center 1998). *Philadelphus lewisii* re-sprouts readily after fire (USDA 2000). The *Philadelphus lewisii* plant association may require occasional flood disturbance to persist. However, due to its spreading root mass, *Philadelphus lewisii* is likely an excellent stream-bank stabilizer. *Philadelphus lewisii* is very sensitive to herbicides, thus, chemical weed control should be limited in areas adjacent to this plant association (USDA 2000). Native Americans use *Philadelphus lewisii* branches for making a wide variety of tools and implements.

SUCCESSIONAL DYNAMICS

Philadelphus lewisii is described as an early-seral to mid-seral species commonly proliferating after disturbances (e.g., burning) (USDA 2000). Like its associated shrubs, it sprouts vigorously from roots after fire, cutting, or above ground removal by floods. It also spreads quickly by suckering. The *Philadelphus lewisii* plant association is likely maintained by occasional flood disturbance on sites favorable for *Philadelphus lewisii* dominance.

WILDLIFE FUNCTIONS

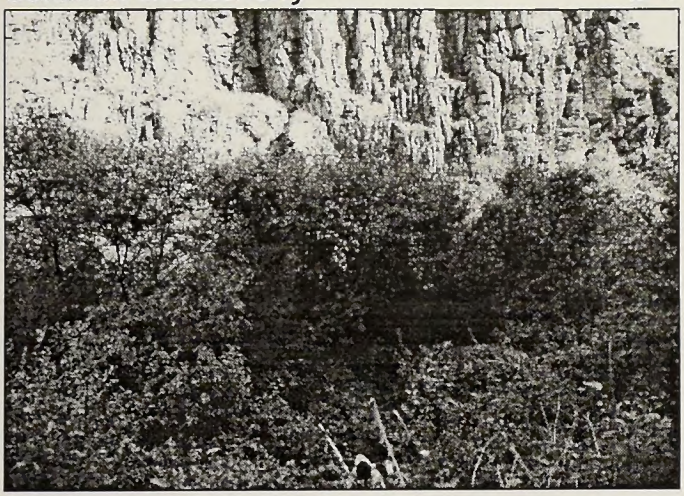
Philadelphus lewisii is moderately important winter forage for wild ungulates, especially deer and elk (USDA 2000). Associated shrubs, especially *Cornus sericea,* are excellent forage while *Prunus virginiana* and *Crataegus columbiana* provide berries for birds, bears, and other wildlife. Quail and squirrels eat *Philadelphus lewisii* seeds (USDA 2000). The plant association likely forms excellent thermal and protective cover for wildlife (USDA 2000).

CLASSIFICATION COMMENTS

The *Philadelphus lewisii* plant association is classified from only three plots in southwest Idaho (Idaho Conservation Data Center 1998, Moseley 1998). This plant association is also known from eastern Oregon and eastern Washington (where some stands have been further classified as the *Philadelphus lewisii/Symphoricarpos albus* plant association) (Crawford 2000, Reid et al. 2000). In Idaho, plots were highly variable in their associated shrubs and understory species composition (Idaho Conservation Data Center 1998, Moseley 1998). Because of this heterogeneity and limited plots sampled, this plant association may better be termed a dominance type. Further sampling throughout its range is needed to better characterize this association.

Prunus virginiana

Common chokecherry n=1



RANGE

The *Prunus virginiana* dominance type is wide ranging, known from Colorado, Idaho, Montana, Nevada, eastern Oregon, South Dakota, eastern Washington, and Wyoming (Reid et al. 2000). In Idaho, it has been sampled in southeastern Idaho, observed on the Snake River Plain of south-central Idaho, and sampled in the Danskin Mountains of southwestern Idaho at the Dry Creek Spring Exclosure (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000). The *Prunus virginiana* dominance type is expected to occur in the canyon lands of the Owyhee Plateau in southwestern Idaho (Moseley 1998).

ENVIRONMENT

In Idaho, the *Prunus virginiana* dominance type is usually found between 4,600 and 4,900 feet elevation, but has been observed as low as 3370 feet and as high as 6435 feet (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000). It is typically located immediately adjacent to springs or seeps in steep and narrow V-shaped drainages, but is also found on alluvial stream terraces, riverine floodplains, and intermittently wet toe-slopes (Jones and Walford 1995, Hall and Hansen 1997). Streams are often spring-fed and perennial. Though often adjacent to springs, the *Prunus virginiana* dominance type is not found on perennially saturated soil (Hall and Hansen 1997, Moseley 1999). Water tables are often at least 1 m deep.

SOILS

Montana research found that soil supporting the *Prunus virginiana* dominance type was both well-drained and well-developed (e.g., Entisols (Torrifluvents) or Mollisols (Haploborolls and Argiborolls)) (Hansen et al. 1995). Soils typically have rich organic surface horizons enriched by copious leaf litter (Hall and Hansen 1997). Soils are deep sandy loams, silt-loams, or silt-clay loams (over 60 cm) overlying rock and sand alluvium (Jones and Walford 1995, Hall and Hansen 1997).

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Salix lutea	100	10	10	10
Rosa woodsii	100	10	10	10
Ribes aureum	100	3	3	3
Prunus virginiana	100	80	80	80
FORBS				
Galium aparine	100	10	10	10
Montia perfoliata	100	1	1	1
Osmorhiza chilensis	100	50	50	50
Urtica dioica	100	1	1	1

VEGETATION COMPOSITION

In Idaho, the *Prunus virginiana* dominance type is characterized by a dense, tall *Prunus virginiana* overstory with a relatively sparse understory that is low in diversity (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000). *Prunus virginiana* is typically 4 to 8 m tall. Several tall understory shrubs may occur, such as *Salix lutea, Crataegus douglasii,* and *Ribes aureum*, each with 10% or less cover (Moseley 1999, Jankovsky-Jones et al. 2000). *Juniperus scopulorum* may occasionally be observed with trace cover (Hall and Hansen 1997, Jankovsky-Jones et al. 2000). The herbaceous understory is highly variable but diversity and cover is generally low within stands. Total graminoid cover, for example, is less than 3% with only *Poa pratensis* and *Carex* spp. notable (Moseley 1999, Jankovsky-Jones et al. 2000). Forb cover is usually moderate and composed both of a few tall forbs (e.g., *Smilacina* spp., *Osmorhiza chilensis, Ligusticum canbyi,* and *Urtica dioica*) and several weedy species (e.g., *Arctium minus, Galium aparine,* and *Cynoglossum officinale*) (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000). Moss and lichen ground cover is minimal while litter (including woody debris) and exposed soil and gravel is high (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000).

ADJACENT COMMUNITIES

In Idaho, slightly wetter riparian communities adjacent to *Prunus virginiana* stands include those

dominated by *Populus* spp., *Betula occidentalis, Cornus sericea,* and *Salix* spp. (e.g., *Salix lasiandra*) (Hall and Hansen 1997, Moseley 1999). Wetter adjacent streambanks are mesic graminoid types such as those dominated by *Carex* spp. Adjacent uplands and drier alluvial terraces are *Artemisia tridentata*-steppe types (with *Symphoricarpos oreophilus* and *Purshia tridentata*) or dominated by *Juniperus scopulorum* or *Pseudotsuga menziesii* (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000).

MANAGEMENT CONSIDERATIONS

Though *Prunus virginiana* is only moderately palatable for livestock, it is quite nutritious (USDA 2000). It is occasionally browsed, and the foliage can be poisonous to livestock in large amounts (Hansen et al. 1995, USDA 2000). Dense stands found in the *Prunus virginiana* dominance type often deter grazing, however, heavy use (by both livestock and wildlife) will eventually open stands. This disturbance, especially with soil exposure, will promote invasion by exotic species such as *Poa pratensis, Bromus tectorum*, and other weeds, as well as *Rosa woodsii* (Hansen et al. 1995, Jones and Walford 1995, Kittel et al. 1999, USDA 2000). Fire kills the above ground stems of *Prunus virginiana* but it readily re-sprouts, especially after spring burning (USDA 2000). Sometimes stem numbers and growth rates are stimulated by fire and soon exceed pre-fire levels. *Prunus virginiana* is useful for planting on disturbed riparian sites (Hansen et al. 1995). Its root system spreads readily and helps stabilize streambanks. In addition, humans harvest *Prunus virginiana* fruits for food, beverages, and medicines (Hansen et al. 1995, USDA 2000).

SUCCESSIONAL DYNAMICS

The *Prunus virginiana* dominance type forms long-lasting communities on relatively stable sites. *Prunus virginiana* is tolerant of a wide range of ecologic conditions and may be either an early seral species or climax species depending on site conditions (USDA 2000). In southeastern Idaho *Prunus virginiana* stands may be an earlier seral stage of *the Juniperus scopulorum/Cornus stolonifera* or *Pseudotsuga menziesii/Cornus stolonifera* plant associations (Hall and Hansen 1997). *Prunus virginiana* is tolerant of occasional flood disturbance and usually occupies protected riparian edges, terraces, and drier margins (Kittel et al. 1999, USDA 2000). Though infrequent in riparian settings, fire may play a role in rejuvenating *Prunus virginiana* stands (USDA 2000). On suitable sites, occasional disturbances may open the stand enough to allow invasion by *Elymus glaucus*, thus, changing the type to *Prunus virginiana/Elymus glaucus*. Too much grazing or disturbance promotes invasion by *Crataegus douglasii, Rosa woodsii, Poa pratensis, Galium* spp., and exotic forbs (Hansen et al. 1995, Jones and Walford 1995, Manning and Padgett 1995). This may result in *Prunus virginiana/Rosa woodsii* stands that represent marginally riparian conditions and succession toward drier habitats (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

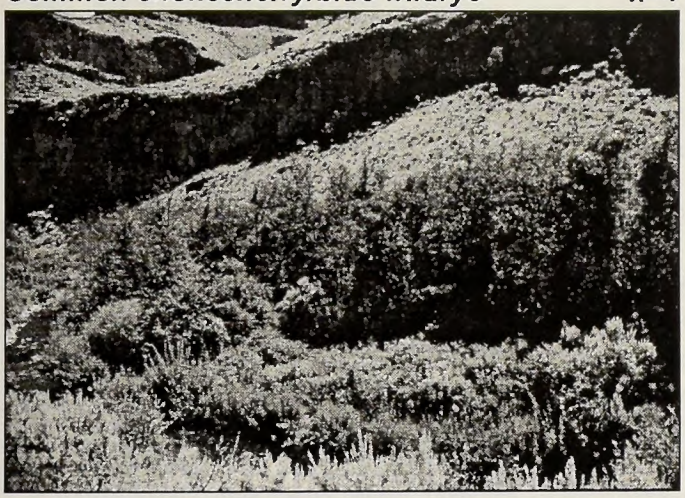
Prunus virginiana fruits are highly valued for food, especially by small mammals and birds (USDA 2000). *Prunus virginiana* forms dense thickets that provide thermal, hiding, and nesting cover for wildlife (Hansen et al. 1995, USDA 2000). In Idaho, mule deer have been observed bedding in *Prunus virginiana* stands (Moseley 1999). *Prunus virginiana* is fair to good quality forage for moose, elk, mule deer, as well as bear, coyote, pronghorn, and bighorn sheep (Hansen et al. 1995, USDA 2000). *Prunus virginiana* is excellent winter browse for elk and deer and is very nutritious. Along channels *Prunus virginiana* shades streams, protects banks and helps keep water temperature and quality ideal for salmonids (Hansen et al. 1995).

CLASSIFICATION COMMENTS

The *Prunus virginiana* dominance type has been described from numerous plots sampled throughout the western United States (Reid et al. 2000). In Idaho, *Prunus virginiana* often forms dense thickets in which there are no consistently important understory shrubs or herbs with high cover and constancy (Hall and Hansen 1997, Moseley 1999, Jankovsky-Jones et al. 2000). Consequently, delineation of a *Prunus virginiana* dominance type seems most practical. There are similarities with other *Prunus virginiana* plant associations (Manning and Padgett 1995, Moseley 1998 and 1999, Oregon Natural Heritage Program 1999, Crawford 2000). However, numerous stands sampled in southern Idaho do not share important indicator species (with necessary cover or constancy) with these types. Classification of *Prunus virginiana* stands is further complicated by site disturbances that create heterogeneous understories (Hansen et al. 1995, Hall and Hansen 1997). Further sampling of *Prunus virginiana* stands may lead to refinements in classification.

Prunus virginiana/Elymus glaucus

Common chokecherry/blue wildrye **n=4**



RANGE

The ***Prunus virginiana/Elymus glaucus*** plant association is known mainly from stream terraces in the canyonlands of the Owyhee Plateau of southwest Idaho. It has been sampled near the Idaho-Nevada border at the foot of the Jarbidge Mountains on Flat Creek, a tributary to the East Fork Bruneau River (Moseley 1999). It is also found in the canyons of Little Jacks Creek and Cottonwood Creek (a tributary of Big Jacks Creek) (Moseley 1998). A very similar ***Prunus virginiana*** plant association has been reported from southeastern Washington (Crawford 2000). Further sampling may extend the range of the ***Prunus virginiana/Elymus glaucus*** association.

ENVIRONMENT

In Idaho, the ***Prunus virginiana/Elymus glaucus*** plant association is found on alluvial terraces of perennial streams at 4,000 to 5,760 feet elevation (Moseley 1998, 1999). In contrast, the similar ***Prunus virginiana*** community from Washington is found along a 1 m wide intermittent stream at 1,120 feet elevation (Crawford 2000). The Owyhee streams are less than 4% gradient and up to 4 m wide, deeply incising canyons in the rhyolitic bedrock of the Owyhee Plateau. The resultant valley bottoms and alluvial terraces are narrow to moderately wide (up to 40 m wide) (Moseley 1998, 1999). The canyon slopes and stream channels are notoriously rocky from colluvial deposition. The alluvial terrace sites are perched (up to 1.5 m above base flow) and flood only in extreme runoff events.

SOILS

Soils are sandy alluvium with few rocks near the surface. Soil information from two plots in Little Jacks Creek was collected (Fisher and Moseley 1998). Soils ranged from 50 to 150 cm deep. The 'A' horizons were thin (3-6 cm) sandy-loams overlying silty to silty-clay-loams or gravel and sand.

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Artemisia tridentata ssp. tridentata	50	1	0	3
Clematis ligusticifolia	100	20	10	30
Cornus sericea	50	3.25	0	10
Prunus virginiana	100	69.5	30	98
Ribes inerme	50	2.75	0	10
Rosa woodsii	100	5.5	1	10
FORBS				
Galium triflorum	75	1.25	0	3
Smilacina stellata	50	1	0	3
Urtica dioica	50	5.75	0	20
FERNS/FERN ALLIES				
Equisetum sp.	25	0.75	0	3
GRAMINOIDS				
Elymus glaucus	100	32.75	1	90
Poa pratensis	75	3.5	0	10

VEGETATION COMPOSITION

Based on stands sampled in Idaho, the *Prunus virginiana/Elymus glaucus* plant association is characterized by an open to dense canopy of *Prunus virginiana* 3 to 9 m tall (Moseley 1998, 1999). The cover of *Prunus virginiana* ranges from 30 to 98%. There is always an open understory shrub layer composed of *Rosa woodsii* and varying amounts of *Cornus sericea* and *Ribes inerme*, both with low cover (Moseley 1998, 1999). *Clematis ligusticifolia*, with an average cover of 20%, is always present clambering through the shrubs. Other than *Elymus glaucus,* the only graminoid with high cover, the herbaceous understory is sparse (Moseley 1998, 1999). *Poa pratensis* is occasionally prominent on degraded sites while *Urtica dioica* is sometimes present with moderate cover. The only other notable herbs are *Smilacina stellata, Equisetum* spp., and *Galium* spp., all with low cover. Species of adjacent alluvial terrace communities, *Artemisia tridentata ssp. tridentata, Bromus tectorum*, and *Elymus cinereus* are occasionally present with low cover (Moseley 1998, 1999).

ADJACENT COMMUNITIES

Cornus sericea sometimes dominates stream channels adjacent to the *Prunus virginiana/Elymus*

glaucus plant association (Moseley 1999). Patches of *Artemisia tridentata* ssp. *tridentata/Elymus cinereus* can be found on alluvial terraces adjacent to this association. Adjacent canyon-slopes support *Artemisia tridentata* ssp. *wyomingensis* stands with *Festuca idahoensis* or *Agropyron spicatum* understories (Moseley 1998).

MANAGEMENT CONSIDERATIONS

Prunus virginiana is a highly useful shrub. For example, humans harvest *Prunus virginiana* fruits for food, beverages, and medicines (Hansen et al. 1995, USDA 2000). *Prunus virginiana* is also moderately palatable and quite nutritious for livestock (USDA 2000). It is occasionally browsed but the foliage can be poisonous to livestock in large amounts (Hansen et al. 1995, USDA 2000). *Prunus virginiana* is moderately tolerant of browsing but heavy grazing will open stands and promote invasion by exotic species (Hansen et al. 1995, USDA 2000). In addition, *Elymus glaucus* is intolerant of heavy grazing and increases when grazing is excluded (USDA 2000). Stands of *Prunus virginiana/Elymus glaucus* that are degraded by excessive livestock use have decreased cover of *Elymus glaucus* and increased *Poa pratensis* (Moseley 1998). Fire kills above ground stems of *Prunus virginiana* but it readily re-sprouts, especially after spring burning (USDA 2000). Sometimes stem numbers and growth rates are stimulated by fire and soon exceed pre-fire levels. *Elymus glaucus* growth can also be stimulated by fire (USDA 2000). Due to the rhizomatous nature of species in this association it provides moderately good streambank erosion control, especially in the long-term (Hansen et al. 1995, USDA 2000). *Elymus glaucus* is a valuable grass for revegetation purposes.

SUCCESSIONAL DYNAMICS

Both *Prunus virginiana* and *Elymus glaucus* are opportunistic species able to colonize a variety of moist, disturbed sites (USDA 2000). However, they are both regularly found in climax communities as well. *Prunus virginiana* dominated stands on moister sites may be related to *Salix* spp. or *Populus* spp. potential vegetation (Hall and Hansen 1997). *Prunus virginiana/Rosa woodsii* stands (similar to but drier than *Prunus virginiana/Elymus glaucus* stands) may represent marginally riparian conditions and succession toward drier habitat (Manning and Padgett 1995). On the Owyhee Plateau and elsewhere, desiccation of terrace sites due to stream downcutting may move the *Prunus virginiana/Elymus glaucus* plant association toward types such as *Juniperus scopulorum/Elymus glaucus* or *Artemisia tridentata* ssp. *tridentata/Elymus cinereus* (Hall and Hansen 1997, Moseley 1998). Excessive disturbance, such as livestock overgrazing, apparently promotes *Rosa woodsii* and *Poa pratensis* (Hansen et al. 1995, Moseley 1998) while decreased grazing promotes *Elymus glaucus* (USDA 2000).

WILDLIFE FUNCTIONS

Prunus virginiana is a very important shrub for birds and wildlife. Its fruits are highly valued for food and it forms dense thickets that provide thermal, hiding, and nesting cover (Hansen et al. 1995). Both *Prunus virginiana* and *Elymus glaucus* are fair to good quality forage for elk, mule deer, and other wildlife (Hansen et al. 1995, USDA 2000). *Prunus virginiana* is excellent winter browse for elk and deer and is very nutritious. Riparian *Prunus virginiana* also shades streams keeping water temperatures ideal for salmonids (Hansen et al. 1995). Beaver activity has also been observed in the *Prunus virginiana/Elymus glaucus* plant association (Moseley 1998).

CLASSIFICATION COMMENTS

The *Prunus virginiana/Elymus glaucus* plant association is described from only four plots in the canyons of the Owyhee Plateau of southwest Idaho (Moseley 1998, 1999). Stands of *Prunus virginiana/Elymus glaucus* have probably been included in a general *Prunus virginiana* dominance type by other classifications. For example, Crawford (2000) reports a plot from southeastern Washington classified as a general *Prunus virginiana* community type as having a conspicuous *Elymus glaucus* layer. *Prunus virginiana* often forms communities with heterogeneous understories (due to disturbance and its tolerance of a wide range of environmental conditions), making classification possible only to the dominance type level (Hansen et al. 1995, Hall and Hansen 1997, Moseley 1998). The *Prunus virginiana/Elymus glaucus* plant association, however, is clearly distinguished from the *Prunus virginiana* dominance type by the high constancy and cover of *Elymus glaucus* (Moseley 1998).

Rhus trilobata shrubland

Skunkbush sumac **n=1**

RANGE

The *Rhus trilobata* plant association has been described in western Colorado and southern Idaho. In Idaho it is especially common along the middle Snake River.

ENVIRONMENT

Stands of *Rhus trilobata* occur in both riverine and non-riverine wetlands. Along rivers stands of *Rhus* are present just above the annual average high water mark where floodplain development is minimal due to bedrock confinement. *Rhus trilobata* stands may also occur on hillsides and swales in association with springs or seeps. Stands have also been observed in intermittent drainages.

SOILS

Soils are shallow sandy loams and silty loams overlying coarse alluvium or bedrock. Sometimes stems of *Rhus trilobata* occur on soil between boulders.

VEGETATION COMPOSITION

Rhus trilobata forms dense, near monocultures with few associates having high cover or constancy. Species that sometimes may be present include *Ribes aureum, Salix exigua, Salix lutea, Salix lasiolepis,* and *Toxicodendron rydbergii.* Herbaceous undergrowth is minor though *Agropyron smithii, Elymus cinereus,* and *Phragmites australis* may sometimes be present.

ADJACENT COMMUNITIES

Along the Snake River, adjacent communities may be dominated by *Sarcobatus vermiculatus/ Distichlis spicata, Phragmites australis,* or *Betula occidentalis.*

MANAGEMENT CONSIDERATIONS

Rhus trilobata is tolerant of seasonal drawdown as roots are able to penetrate to the water table through cracks in bedrock (Kittel et al. 1999). *Rhus trilobata* has potential as a species for erosion control and may be used for streambank restabilization. This species will regenerate from sprouts and will resprout after fire. Seed dormancy in *Rhus trilobata* is released by scarification and plants may be used in restoration projects (Shaw and Hurd 2000).

SUCCESSIONAL DYNAMICS

The successional status of the *Rhus trilobata* plant association is unclear. Hall and Hansen (1997) suggest that it may represent climax vegetation along narrow floodplains or is a seral state of the *Juniperus scopulorum/Cornus sericea* association. Kittel et al. (1999) indicate that it appears to be a late seral association since it occurs at or above the high water mark of the channel.

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Clematis ligusticifolia	100	1	1	1
Rhus trilobata	100	98	98	98
FORBS				
Urtica dioica	100	1	1	1

WILDLIFE FUNCTIONS

The dominant shrub is only moderate browse for wild and domestic ungulates (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Numerous stands of *Rhus trilobata* have been sampled in Idaho (Cole 1995, Cole 1996, Hall and Hansen 1997), Montana (Hansen et al. 1995), and Colorado (Kittel et al. 1999). However, the *Rhus trilobata* stands occur in two distinct environmental settings; on banks of large rivers and on seeps or springs in canyons. Stands are typically so thick that herbaceous undergrowth is poorly developed and diagnostic plant species distinguishing the two associations are unclear.

Salix exigua/Barren

Sandbar willow/Barren **n=6**

RANGE

Stands occur in Idaho (Jankovsky-Jones 1996, 1997a, 1997b, 1997c, Moseley 1998), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), and probably elsewhere.

ENVIRONMENT

This association occurs along actively flooded streambanks, pointbars, islands, or on nearby stream terraces. Flooding in this association is probably an annual event. The soils are young and fluvial in origin. It can occur in narrow to wide valley bottoms with very low to moderate gradients. Elevations are mostly below 5,500 feet (Padgett et al. 1989, Manning and Padgett 1995, Moseley 1998).

SOILS

Soils are highly variable, ranging from highly stable Cumulic Haplaquolls and Aquic Cryoborolls to early developmental Typic Udifluvents. All have developed on alluvium of varying ages. Estimated available water-holding capacity ranged from low to high, and particle-size classes include fine-loamy and sandy-skeletal. Water tables ranged from near the surface to over 1 m below the surface (Padgett et al. 1989).

VEGETATION COMPOSITION

An open to dense stand of *Salix exigua* dominates the overstory of this otherwise depauperate association. Other willows, such as *S. lasiandra, S. amygdaloides,* and *S. lutea,* may occasionally be minor components. *Rosa woodsii, Ribes inerme,* or *Cornus sericea* may be present in the shrub layer, but in very low cover. The undergrowth is open with predominantly bare ground, rock, or leaf litter. Forb species are scattered and have low cover, although diversity may be high. Graminoids are generally absent or in low cover (Manning and Padgett 1995).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Salix exigua	100	46.7	10	90
FORBS				
Artemisia ludoviciana	67	1.3	0	3
Euthamia occidentalis	50	1.2	0	3
Rumex crispus	67	0.7	0	1
Solidago missouriensis	50	0.5	0	1
Xanthium strumarium	50	0.8	0	3
GRAMINOIDS				
Agropyron repens	50	0.8	0	3
Phalaris arundinacea	50	0.5	0	1

ADJACENT COMMUNITIES

A wide range of upland associations can occur on adjacent slopes, ranging from salt desert shrub and sagebrush-steppe associations at the lower elevations to low-montane coniferous woodlands and forests at the higher elevations.

MANAGEMENT CONSIDERATIONS

There is essentially no herbaceous livestock forage available in this type. The willows provide stability of streambanks as well as stream shading.

SUCCESSIONAL DYNAMICS

The *Salix exigua*/Barren type is an early successional type with little undergrowth development. Some stands have rather xeric soils, which inhibits the establishment of herbaceous species, while others are very wet, but have had insufficient time for establishment. Succession in this association without outside disturbance will likely lead toward the *Salix exigua*/Mesic forb or *S. exigua*/Mesic graminoid types in moist situations, while drier sites may develop into the *S. exigua/Poa pratensis* community (Padgett et al. 1989).

WILDLIFE FUNCTIONS

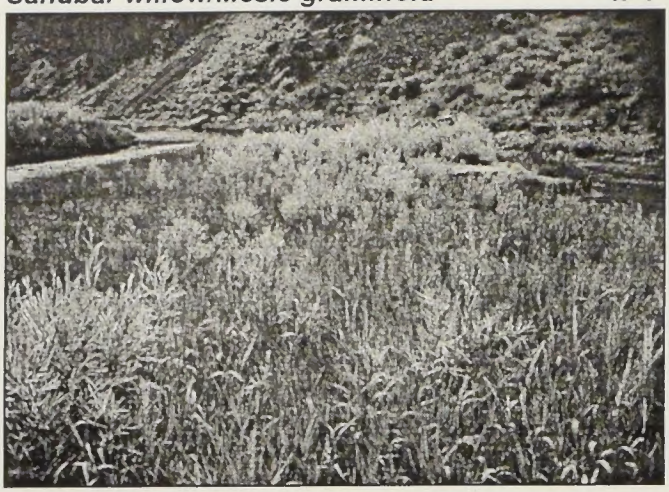
Stands of this association provide excellent thermal and hiding cover for a wide range of wildlife species. *Salix exigua* is normally not as heavily browsed as other willow species. Beavers utilize *Salix exigua* for both food and for constructing dams (Hansen et al. 1995).

CLASSIFICATION COMMENTS

This is a well sampled and analyzed association documented with numerous plots. Manning and Padgett (1995) described the *Salix exigua*/Bench community from Nevada that is considered the same as the *Salix exigua*/Barren type of Padgett et al. (1989). Tuhy and Jensen (1982) described a similar type with no diagnostic undergrowth for central Idaho. One or more of Cole's (1995) *Salix exigua* types may be included here.

Salix exigua/Mesic graminoid

Sandbar willow/Mesic graminoid **n=7**



RANGE

Stands occur throughout Utah in extreme western Colorado (Padgett et al. 1989) and throughout Idaho (Padgett et al. 1989, Jankovsky-Jones 1996, 1997a, 1997b, 1997c, Moseley 1998).

ENVIRONMENT

This type occurs on stream terraces and in meadows associated with stream channels from 2,000 to 7,700 feet. Valley bottoms may be narrow to very wide and of low to moderate gradient. This association is usually not in the most dynamic portion of the floodplain, as are some of the other *Salix exigua* types (Padgett et al. 1989).

SOILS

Water tables range from the surface to over 1 m below the surface. Distinct and prominent mottles are common within 10 cm of the surface, indicating a seasonally high water table. Soils indicate a broad range of development, from the well-developed Terric Borohemists, Cumulic Haploborolls, Typic Cryaquolls, and Pachic Cryoborolls to less-developed Aquic Cryofluvents and Fluvaquentic Haploxerolls. Soils develop on alluvial depositions of varying ages. Particle-size classes were highly variable, with estimated available water-holding capacity from low to moderate (Padgett et al. 1989).

VEGETATION COMPOSITION

Salix exigua dominates the overstory of this type. *Salix lutea* and/or *S. lasiandra* may also be prominent in the overstory and, in some instances, may co-dominate. Other shrubs are typically minor components of this type. The undergrowth is characterized by moderate to dense cover of graminoid species, including *Carex nebrascensis, C. lanuginosa, Juncus balticus, Eleocharis palustris, Agrostis stolonifera, Scirpus pungens, Agropyron repens*, and, in one Idaho stand, *C. sheldonii.* Forb cover is typically sparse (Padgett et al. 1989), although *Equisetum* spp. (*E. arvense* and *E. laevigatum*) and *Euthamnia occidentalis* can occasionally occur with relative high cover.

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Salix exigua	100	69.7	20	98
Salix lutea	71	1.3	0	3
Rosa woodsii	57	2.1	0	10
FORBS				
Plantago major	86	1.1	0	3
Euthamia occidentalis	71	12.0	0	40
Mentha arvensis	71	1.0	0	3
Potentilla anserina	71	0.7	0	1
Xanthium strumarium	71	3.4	0	20
Apocynum cannabinum	57	0.9	0	3
Glycyrrhiza lepidota	57	1.1	0	3
Aster hesperius	43	6.3	0	40
Cicuta maculata	43	0.7	0	3
Rumex crispus	43	0.4	0	1
FERNS AND FERN ALLIES				
Equisetum arvense	71	23.3	0	60
Equisetum laevigatum	57	8.1	0	50
GRAMINOIDS				
Eleocharis palustris	100	5.0	1	20
Carex lanuginosa	71	2.9	0	10
Phalaris arundinacea	71	2.1	0	3
Scirpus pungens	71	5.3	0	20
Agropyron repens	43	7.7	0	50
Agrostis stolonifera	43	8.7	0	40
Crypsis alopecuroides	43	0.4	0	1
Leersia oryzoides	43	0.4	0	1

ADJACENT COMMUNITIES

Because of the wide elevational gradient over which this type occurs, adjacent upland associations can range from sagebrush-steppe to coniferous forest associations.

MANAGEMENT CONSIDERATIONS

The rhizomatous graminoid cover in this association results in high soil-holding and streambank stabilization ability. Should the stands become drier and/or grazing levels increase, this type might be replaced by the *Salix exigua/Poa pratensis* or possibly the *S. exigua*/Barren association.

SUCCESSIONAL DYNAMICS

In most situations, the *Salix exigua*/Mesic graminoid association is considered an early successional type pioneering sand and gravel bars. However, it may be persistent in certain instances. This type appears in general to be wetter that other *Salix exigua* types and the environment is likely to be more favorable to the establishment of rhizomatous graminoids (Padgett et al. 1989).

WILDLIFE FUNCTIONS

Stands of this association provide excellent thermal and hiding cover for a wide range of wildlife species. *Salix exigua* is normally not as heavily browsed as other willow species. Beavers tend to utilize *Salix exigua* heavily (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Classification is based on 7 plots from Utah and adjacent southeastern Idaho and western Colorado (Padgett et al. 1989) and 7 plots in southwestern Idaho.

Salix geyeriana/Carex utriculata

Geyer's willow/bladder sedge **n=2**

RANGE

This is a common and widespread type in the Intermountain and Rocky Mountain areas. It is distributed from the eastern Sierra Nevada (Manning and Padgett 1995) and central Oregon (Kovalchick 1987) on the west, across northeastern Oregon (Crowe and Clausnitzer 1997), Idaho (Tuhy 1981, Tuhy and Jensen 1982, Mutz and Queiroz 1983, Youngblood et al. 1985, Jankovsky-Jones 1996, Hall and Hansen 1997), Nevada (Manning and Padgett 1995), and northern Utah (Padgett et al. 1989) to Colorado (Kittel et al. 1999), Wyoming (Norton et al. 1981, Chadde et al. 1988, Walford et al. 1997) and Montana (Hansen et al. 1995).

ENVIRONMENT

Throughout its distribution, this association occurs in mountains and high valleys at elevations ranging from 4,300 to 9,000 feet. This type is most common on broad, level floodplains, but does occur in narrow bands along smaller streams in open, U-shaped valleys. Valley bottom gradients are usually low. Surface microtopography is often hummocky as a result of the irregular buildup of organic material. Hydrology of these sites is usually maintained through subirrigation and soil moisture is maintained at or near the surface in most cases. These sites may or may not be annually flooded during high water in the spring and early summer.

SOILS

This association occurs on a range of soil types that are typically wet, cold, and organic or have organic surface horizons. They are generally classified as Mollisols and Histisols. Organic surface horizons, often extending to a depth of 10 cm or more, are riddled with fibrous root and plant material. Soil textures are categorized as fine, generally silts and clays. Deeper alluvial mineral deposits are comprised of both coarse and fine sands and gravels. The soils are usually mottled (Hall and Hansen 1997).

VEGETATION COMPOSITION

Salix geyeriana dominates the open overstory and characteristically appears in large, often widely spaced clumps. *Salix geyeriana* can be as much as 3 m tall. A diversity of other shrubs may be present, but usually in low amounts. Some of these subordinate shrubs include *Betula glandulosa, Salix boothii, Salix drummondiana, Ribes inerme, Lonicera involucrata, Pentaphylloides floribunda,* and *Alnus incana*. The lower shrubs of this group often occur at the base of *S. geyeriana*. *Carex utriculata* clearly dominates the understory. Other sedges and grasses, such as *Carex aquatilis, Carex interior,* and *Calamagrostis canadensis*, may be present, but they have low cover. Forb species are sparse, but *Geum macrophyllum* appears to be the most constant species across the range of this type.

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Salix geyeriana	100	45	40	50
Salix lemmonii	50	0.5	0	1
FORBS				
Aster ascendens	50	0.5	0	1
Cirsium vulgare	50	0.5	0	1
Epilobium ciliatum	50	0.5	0	1
Galium triflorum	50	0.5	0	1
Geum macrophyllum	100	1	1	1
Hypericum formosum	100	1	1	1
Mimulus guttatus	50	0.5	0	1
Montia chamissoi	50	0.5	0	1
Senecio hydrophilus	50	0.5	0	1
Veratrum californicum	50	0.5	0	1
GRAMINOIDS				
Carex utriculata	100	94	90	98
Carex nebrascensis	50	0.5	0	1
Deschampsia elongata	50	0.5	0	1
Glyceria grandis	50	0.5	0	1

ADJACENT COMMUNITIES

Adjacent upland and riparian associations vary considerably across the wide range of this type. Upland types include sagebrush-steppe, aspen, and coniferous forest. Adjacent riparian associations are even more diverse and too numerous to mention

here, but mostly include other willow types and those dominated by graminoids.

MANAGEMENT CONSIDERATIONS

The wet organic soils can be strongly impacted by livestock and heavy machinery, but the dense roots and rhizomes of *Carex utriculata* bind the soils and stabilize the site. Loss of the shallow water table, through soil damage and/or stream incision will initially shift undergrowth composition towards drier graminoids and forbs. Willow regeneration will be limited and the mature individuals will eventually become decadent. *Carex utriculata* provides a very high level of streambank stabilization.

SUCCESSIONAL DYNAMICS

The *Salix geyeriana/Carex utriculata* association is the wettest of all *S. geyeriana* types. Prolonged, intense utilization by livestock and wild ungulates may shift the site potential to a drier grazing disclimax, characterized by more open stands with exotic grasses, such as *Poa pratensis* and *Agrostis stolonifera,* dominating the understory. Beavers may exert a significant influence on sites as well. Active dams maintain high water tables needed to support this type. However, sustained removal of willows by beavers may reduce the site to a *Carex utriculata* association. When beaver abandon a site, the dams eventually deteriorate and the water table may drop, shifting the site potential to the *S. geyeriana/Calamagrostis canadensis* type (Hall and Hansen 1997).

WILDLIFE FUNCTIONS

A diversity of wildlife species, ranging from small mammals and rodents to amphibians and songbirds, use this type for food, cover and nesting. Moose and beaver, in particular, are important in this association. Beaver may provide a vital role in the maintenance of this association in many places by maintaining high water tables (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

This association has been quantitatively defined and described by at least 12 studies throughout the Intermountain region and Rocky Mountains. All these classifications have used the old name, *Carex rostrata*, which is now known to be strictly boreal. This name is now superseded by *C. utriculata* (Reznicek 1987). Because of the wide geographic distribution, different studies have taken different approaches to its classification, with some taking rather narrow approach and others taking a much broader view of this type. Most of the variability revolves around the treatment of *Salix boothii, Salix drummondiana,* and *Carex aquatilis. Salix geyeriana* and *S. boothii* have been treated differently in different classifications. For example, Hansen et al. (1995) in Montana include all combinations of *S. geyeriana* and *S. boothii* in their *Salix geyeriana* types, citing similarities between the two species in the environments they occupy and in management issues. On the other hand, Padgett et al. (1989) place stands with at least 25% cover of *S. boothii* into their *S. boothii* associations, even if the stands have greater cover of the taller *S. geyeriana*, arguing that that much *S. boothii* cover significantly alters the structure of the vegetation. Some studies have taken an even broader approach by lumping stands dominated by *Salix geyeriana* and *S. drummondiana,* as well as *S. boothii, S. lemmonii, S. bebbiana, S. wolfii* and/or *Betula glandulosa,* into a generic *Salix/Carex utriculata* type (e.g., Tuhy and Jensen 1982, Kovalchik 1987, Crowe and Clausnitzer 1997). Studies have also taken varying approaches to the amount of *Carex aquatilis* in this association. Some studies (e.g., Youngblood et al. 1985, Mutz and Queiroz 1983, Hall and Hansen 1997) take the broad view by defining a *S. geyeriana/Carex utriculata* type with either *C. utriculata* or *C. aquatilis* as the herbaceous dominant. A narrower approach has been taken by others (e.g., Padgett et al. 1989, Walford et al. 1997, Kittel et al. 2000), where *C. utriculata* is the sole herbaceous dominant and *C. aquatilis*-dominated sites would be a different association. The association described here is a narrow one, that is *Salix boothii*-dominated sites are treated as different associations (sensu Padgett et al. 1989, Walford et al. 1997, and others) and *Carex aquatilis*-dominated understory similarly defines a separate association (sensu Padgett et al. 1989 and others).

Salix geyeriana/Mesic forb

Geyer's willow/Mesic forb **n=2**

RANGE

The *Salix geyeriana*/Mesic forb association is a widely scattered, minor type known from southern and eastern Idaho, western Wyoming, Utah, and Colorado (Youngblood et. al. 1985, Padgett et al. 1989, Walford et al. 1997).

ENVIRONMENT

The *Salix geyeriana*/Mesic forb association is found in narrow to wide valleys of rolling highlands and mountains. In Idaho, elevations range from 5100 feet to over 7800 feet in the east (Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Moseley and Murphy 1998). The association is found both on terraces adjacent to small creeks or braided rivers and near the drier margins of wetland floodplains. Sites supporting the association are variable and include headwaters of small, rocky, and shallow spring-fed creeks (only 1 m wide) and larger mountain rivers. Valley gradients range from less than 2% to 5%. *Salix geyeriana*/Mesic forb is on drier or better-drained sites than other *Salix geyeriana* associations.

SOILS

Soil textures are loamy skeletal, fine-loamy, clayey-skeletal, and sandy with moderate available water capacity (Youngblood et al. 1985, Padgett et al. 1989, Walford et al. 1997). Soils are often Cryoborolls (Aquic, Pachic, or Cumulic) but also include Cryofluvents or Cumulic Cryaquolls. The water table is seasonally within 50 cm of the surface (as evidenced by mottling) but drops to over 1 m deep by late summer (Youngblood et al. 1985, Padgett et al. 1989, Walford et al. 1997).

VEGETATION COMPOSITION

Salix geyeriana/Mesic Forb is clearly dominated by *Salix geyeriana* with *Salix boothii* sometimes also present (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Moseley 1999). *Salix geyeriana* tends to grow in clumps separated by corridors. Other tall willows, such as *Salix drummondiana* and *Salix lutea*, occasionally occur with moderate cover, but are not dominant. A few trees may be present with low cover, including conifers or *Populus tremuloides*. There is a low shrub layer often dominated by *Ribes inerme* and *Pentaphylloides floribunda*. In addition, several other shrubs are occasionally present with low cover including *Lonicera involucrata, Ribes aureum,* and *Ribes lacustre* (Youngblood et al. 1985, Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Walford et al. 1997, Moseley and Murphy 1998). A diverse, but variable, mixture of mesic forbs form multiple layers in the understory. The most common and widespread forbs are *Aconitum columbianum, Fragaria virginiana*, and *Geum macrophyllum* (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Moseley 1999). Other common forbs, usually with less than 15% cover, are *Smilacina stellata, Aster foliaceus, Geranium* spp., and *Equisetum arvense*. Other forb species, sometimes with moderate to high cover, but lower constancy, throughout the associations range are *Mertensia* spp., *Polemonium occidentale, Urtica dioica, Thalictrum* spp., *Heracleum lanatum, Potentilla gracilis, Epilobium ciliatum, Mimulus guttatus,* and *Angelica arguta* (Youngblood et al. 1985, Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Walford et al. 1997, Moseley 1999). The graminoid layer is poorly developed and includes weedy exotic species such as *Agrostis stolonifera*, *Poa pratensis,* and *Phleum pratense*. The most common native graminoids are *Carex* spp., mainly *Carex microptera*. Moss and lichen cover is variable, ranging from zero to 40% of ground cover.

ADJACENT COMMUNITIES

Wetter types adjacent to *Salix geyeriana*/Mesic Forb include *Carex utriculata, Carex nebrascensis Eleocharis* spp., *Phalaris arundinacea, Puccinellia pauciflora, Hordeum brachyantherum,* and *Salix geyeriana/Carex utriculata* or *Carex aquatilis* associations (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997). *Salix geyeriana* is more tolerant of drier soil than *Salix boothii* or *Salix drummondiana,* thus, associations dominated by the latter two willows may be adjacent on wetter ground. Adjacent on sites with a similar, or slightly drier, moisture regime, are *Salix geyeriana/Poa pratensis, Salix geyeriana/Calamagrostis canadensis, Salix geyeriana/Deschampsia cespitosa,* and other *Salix* dominated associations (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997). Other adjacent associations include those with high cover of *Prunus virginiana, Cornus sericea, Betula occidentalis*, or *Populus tremuloides*. Adjacent drier valley bottom sites are meadow associations dominated by *Deschampsia cespitosa, Poa pratensis,* and *Pentaphylloides floribunda* (Youngblood et al. 1985, Padgett et al. 1989). Adjacent uplands are usually forests dominated by *Pinus contorta, Pseudotsuga menziesii, Juniperus*

occidentalis, Abies lasiocarpa, Picea spp., or *Populus tremuloides. Artemisia tridentata* ssp. *vaseyana* steppe may also be adjacent (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Moseley 1999).

MANAGEMENT CONSIDERATIONS

Salix geyeriana/Mesic forb is a moderately productive association for livestock and *Salix geyeriana* is more palatable to livestock than *Salix boothii* (Crowe and Clausnitzer 1997). This association has many corridors between willow clumps, which allow livestock access, thus, impacts from grazing must be closely monitored (Hall and Hansen 1997). Overgrazing of *Salix geyeriana* causes lost vigor, decreased stand density, and eventual elimination. After overgrazing, *Salix geyeriana* stands can regain vigor if rested for at least 3 to 6 years (Crowe and Clausnitzer 1997). The mesic forb understory, however, will become dominated by *Poa pratensis* or other weedy species that increase with grazing (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Walford et al. 1997). Livestock grazing, as well as human developments (e.g. roads, recreation sites, etc.), compact the Mollisol soils of *Salix geyeriana*/Mesic forb and are not usually compatible (especially under wet conditions). When the association converts to *Poa pratensis* dominance, streambank stability decreases and cattle trampling causes bank sloughing, creek overwidening, and water table alterations (Padgett et al. 1989, Hall and Hansen 1997). Though the mesic forb understory does not have significant soil stabilizing ability, *Poa pratensis* roots are even poorer soil binders. *Salix geyeriana* will sprout vigorously after fire, especially in wetter stands after quick, hot fires. Prescribed burning is effective in rejuvenating old clumps (Hansen et al. 1988, Hall and Hansen 1997). *Salix geyeriana,* though more difficult to root than *Salix boothii* or *Salix drummondiana,* is valuable for revegetation of streambanks. It has high value for stabilizing streambanks, trapping debris, and creating pools, thus, reducing erosional energy (Hansen et al. 1988, Hall and Hansen 1997).

SUCCESSIONAL DYNAMICS

Little information exists on the successional dynamics of the *Salix geyeriana*/Mesic forb association. However, it is hypothesized that under heavy livestock grazing the association will move toward *Salix geyeriana/Poa pratensis* with which it shares a similar forb understory (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Walford et al. 1997). Understory shrub and forb composition may be the result of disturbances (e.g. some species, such as *Rosa woodsii,* increase under livestock grazing while others decrease) (Weixelman et al. 1996, Hall and Hansen 1997). It is less likely to form on organic soil sites (formerly wet and occupied by *Salix geyeriana/Carex utriculata* or *Carex aquatilis*) and may be more related to *Salix geyeriana/Deschampsia cespitosa* sites (Padgett et al. 1989).

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Amelanchier alnifolia	50	0.5	0	1
Ribes aureum	50	1.5	0	3
Ribes inerme	100	5.5	1	10
Salix boothii	50	0.5	0	1
Salix drummondiana	50	0.5	0	1
Salix geyeriana	100	80	70	90
Salix lutea	50	15	0	30
FORBS				
Veratrum californicum	50	0.5	0	1
Urtica dioica	50	1.5	0	3
Stellaria crispa	50	0.5	0	1
Smilacina stellata	50	0.5	0	1
Senecio pseudareus	50	10	0	20
Mimulus guttatus	100	20.5	1	40
Heracleum lanatum	50	0.5	0	1
Geum macrophyllum	100	5.5	1	10
Galium aparine	50	1.5	0	3
Epilobium ciliatum	50	15	0	30
Cirsium arvense	50	0.5	0	1
Circaea alpina	50	5	0	10
Cerastium viscosum	50	0.5	0	1
Arctium minus	50	0.5	0	1
Aconitum columbianum	50	10	0	20
GRAMINOIDS				
Agrostis stolonifera	100	1	1	1
Carex mariposana	50	0.5	0	1
Carex nebrascensis	50	0.5	0	1
Glyceria grandis	50	0.5	0	1
Juncus ensifolius	50	1.5	0	3
Poa pratensis	50	0.5	0	1
Puccinellia pauciflora	50	1.5	0	3
Scirpus microcarpus	50	0.5	0	1

WILDLIFE FUNCTIONS

The *Salix geyeriana*/Mesic forb association provides good cover, bedding, and forage for wildlife such as beaver, deer, moose, small mammals, and elk

(Hansen et al. 1988, Hall and Hansen 1997). Songbirds also use this association for nesting and foraging. The dense root network of *Salix geyeriana* both shades and stabilizes streambanks, creating excellent fish habitat (Hansen et al. 1988, Hall and Hansen 1997).

CLASSIFICATION COMMENTS

The *Salix geyeriana*/Mesic forb association is sometimes lumped within broader associations when dominance by *Salix geyeriana* is not obvious. For example, Weixelman et al. (1996) described a Cold Willow/Mesic Forb association in central Nevada while Crowe and Clausnitzer (1997) described a Willow/Mesic Forb type for northeastern Oregon, both of which may have high cover of *Salix geyeriana, Salix boothii,* or hybrids. Similarly, a general *Salix geyeriana* associations described in eastern Idaho may include stands with mesic forb understories (Hall and Hansen 1997). In contrast, older studies may have split *Salix geyeriana*/Mesic forb into associations such as *Salix geyeriana/Geum macrophyllum* (Tuhy 1981) and *Salix geyeriana/Fragaria virginiana* (Mattson 1984). These two associations may represent grazing induced variants of *Salix geyeriana*/Mesic forb. Several other associations, such as Mesic forb meadow, *Salix boothii/Smilacina stellata,* and *Salix boothii*/Mesic Forb, may floristically resemble *Salix geyeriana*/Mesic forb. However, when undisturbed, *Salix geyeriana*/Mesic forb is defined by obvious dominance by *Salix geyeriana* (Youngblood et al. 1985, Padgett et al. 1989).

Salix geyeriana/Mesic graminoid

Geyer's willow/Mesic graminoid

RANGE

Salix geyeriana/Mesic graminoid is a widely distributed major type throughout the Rocky Mountains and pacific northwest.

ENVIRONMENT

Salix geyeriana/Mesic graminoid is often found in wide valleys and basins filled with Quaternary alluvium or morainal outwash, such as alpine cirques and U-shaped troughs. It is also located in narrow valleys (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). The association is found on seasonally saturated sites such as flat, gently sloping, or hummocky streambanks, terraces (about 60 cm above bankfull channel), benches, floodplains, moist meadows, and, occasionally, gravel bars. It is usually adjacent to meadow seeps and springs or streams which seasonally flood (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). However, it is sometimes in old floodplains now abandoned due to lateral stream migration. Typical associated streams vary from moderate gradient, narrow and meandering to low gradient braided rivers (Manning and Padgett 1995, Walford et al. 1997). The association is found at elevations ranging from 5400 to 7300.

SOILS

Soils are cold and moist with organic horizons. They are usually categorized as silt loams, silty clay loams, or clay loams with moderate to high water holding capacity (Padgett et al. 1989, Manning and Padgett 1995). However, coarse loamy, loamy skeletal, and recent sandy alluvium soils are sometimes present, (Weixelman et al. 1996, Walford et al. 1997). Soils are most often classified as Cryaquolls (Typic) and Cryoborolls (Typic and Pachic), and Cryofluvents (Typic), but Borosaprists, Borofibrists, Haplaquolls, and Haploborolls are also observed (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). Soils often have redoximorphic features (usually mottling) within 50 cm of the surface. The water table usually ranges from the surface to 76 cm deep (occasionally deeper). Due to slow decomposition and high production of these sites, litter/duff cover is high.

VEGETATION COMPOSITION

The *Salix geyeriana*/Mesic graminoid association is characterized by an open canopy of clumped, 2-3 m tall, *Salix geyeriana*. *Salix boothii* is occasionally mixed with *Salix geyeriana*. Scattered around the bases of these willows are lower shrubs, usually *Ribes inerme,* but also *Ribes aureum*, *Rosa woodsii, Pentaphylloides floribunda, Salix lemmonii,* and *Salix wolfii.* The herbaceous understory is dominated by a diverse mix of mesic graminoid species that varies in composition depending on the amount of grazing disturbance. *Poa pratensis* is ubiquitous in all stands. In mid or late-seral stands, the most common graminoids are *Carex lanuginosa*, *Deschampsia cespitosa*, *Carex microptera*, and occasionally *Carex nebrascensis*. Other graminoids in less disturbed stands, occassionally with moderate cover and constancy, include *Calamagrostis canadensis, Carex aquatilis, Carex simulata, Carex subnigricans, Carex utriculata, Glyceria* spp. (e.g. *Glyceria striata*), *Elymus trachycaulus,* and others. The cover of mesic forbs is less than that of graminoids. The most common species, usually with low cover and variable constancy, are often indicative of some disturbance. Forb species include: *Taraxacum officinale*, *Achillea millefolium, Trifolium* spp., *Thalictrum* spp., *Potentilla gracilis, Geum macrophyllum, Smilacina stellata,* and *Iris missouriensis* (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). Moss cover can be high but its constancy is low.

ADJACENT COMMUNITIES

Wetter associations adjacent to *Salix geyeriana*/Mesic graminoid stands include springs or seeps dominated by *Carex aquatilis, Carex utriculata,* or *Carex nebrascensis* (Manning and Padgett 1995, Weixelman et al. 1996). Adjacent riparian associations with similar moisture regimes are *Salix wolfii/Deschampsia cespitosa, Salix boothii*/Mesic graminoid, various other *Salix* types (e.g. those dominated by *Salix exigua, S. lemmonii,*

or *S. planifolia*), *Iris missouriensis,* or *Deschampsia cespitosa* (Manning and Padgett 1995, Walford et al. 1997). Neighboring on slightly drier floodplains are *Populus tremuloides/Symphoricarpos albus, Poa pratensis* meadow, and *Artemisia cana* stands (Padgett et al. 1989, Weixelman et al. 1996). Uplands adjacent to *Salix geyeriana*/Mesic graminoid are dominated by conifers, *Populus tremuloides,* and *Artemisia tridentata* ssp. *vaseyana* steppe (Padgett et al. 1989, Manning and Padgett 1995).

MANAGEMENT CONSIDERATIONS

The high cover of grasses and sedges makes *Salix geyeriana*/Mesic graminoid highly productive for livestock forage. Overgrazing of *Salix geyeriana* causes lost vigor, decreased stand density, and eventual elimination. After overgrazing, *Salix geyeriana* stands regain vigor if rested for at least 3 to 6 years (Kovalchik 1987, Hansen et al. 1995, Crowe and Clausnitzer 1997). However, the mesic graminoid understory will become dominated by *Poa pratensis* or other weedy species (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). *Poa pratensis* is palatable, moderately productive, and tolerant of heavy grazing (Kovalchik 1987). Livestock grazing, as well as human developments (e.g. roads, recreation sites, etc.), may compact the wet soils of *Salix geyeriana*/Mesic graminoid and these uses are not usually compatible. When the association converts to *Poa pratensis* dominance, streambank stability decreases and cattle trampling causes bank sloughing, creek overwidening, and water table alterations (Kovalchik 1987, Padgett et al. 1989, Manning and Padgett 1995, Hansen et al. 1995). The *Carex* sod mats, characteristic of a high quality understory, have excellent soil stabilizing ability. In contrast, *Poa pratensis* roots are poor soil binders. *Salix geyeriana* will sprout vigorously after fire, especially in wetter stands after quick, hot fires. Thus, prescribed burning is effective in rejuvenating old clumps (Hansen et al. 1995). *Poa pratensis* and other graminoids resprout better after cooler fires (Hansen et al. 1995, Kovalchik 1987). *Salix geyeriana,* though more difficult to root than *Salix boothii* or *Salix drummondiana,* is valuable for revegetation of streambanks. It has high value for stabilizing streambanks, trapping debris, creating pools, and reducing erosional energy (Hansen et al. 1995). Re-establishment of willows may help raise the water table and allow eventual invasion by native species such as *Carex lanuginosa* (Kovalchik 1987).

SUCCESSIONAL DYNAMICS

While *Salix geyeriana*/Mesic graminoid does exist in less disturbed, late-seral states (with an understory of *Carex* spp., *Calamagrostis canadensis, Deschampsia cespitosa,* and other native species), it more often reflects disturbance by livestock grazing with understories dominated by exotic grasses and native increasers (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). Similarly, understory shrub and forb composition may be the result of grazing disturbance (e.g. some species, such as *Achillea millefolium, Rosa woodsii,* and *Taraxacum officinale* increase under grazing while others decrease) (Weixelman et al. 1996, Hall and Hansen 1997). It is hypothesized that under persistent, heavy livestock grazing the association will move toward *Salix geyeriana/Poa pratensis, Salix geyeriana/Poa palustris, Salix geyeriana/Mesic graminoid-* Forb, or *Salix geyeriana*/Mesic Forb (Youngblood et al. 1985, Evenden 1989, Padgett et al. 1989, Walford et al. 1997). Continued overgrazing may directly or indirectly eliminate *Salix geyeriana,* by decreasing its vigor or altering hydrologic conditions (Hall and Hansen 1997). The resulting associations may be drier types such as *Poa pratensis* meadows, mesic graminoid or forb meadows, conifer types, or *Populus tremuloides* associations. The association naturally forms on frequently flooded gravelbars, streambanks, or springs with bare sand and gravel substrates necessary for willow establishment (Weixelman et al. 1996, Walford et al. 1997). Alternatively, *Salix geyeriana*/Mesic graminoid possibly originated from *Salix geyeriana/ Calamagrostis canadensis, Salix geyeriana/Carex aquatilis, Salix geyeriana/Carex rostrata,* or *Salix geyeriana/Deschampsia cespitosa* associations which have been disturbed by grazing and subsequently invaded by various mesic graminoid species (Mutz and Queiroz 1983, Youngblood et al. 1985, Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997, Walford et al. 1997).

WILDLIFE FUNCTIONS

The *Salix geyeriana*/Mesic graminoid association provides good cover, bedding, and forage for wildlife such as beaver, deer, moose, small mammals, and elk (especially in the winter) (Hansen et al. 1995, Walford et al. 1997). *Salix geyeriana* has moderate to high value as ungulate and beaver forage (Manning and Padgett 1995, Crowe and Clausnitzer 1997). Songbirds, upland gamebirds, and other birds use this association for nesting and foraging (Crowe

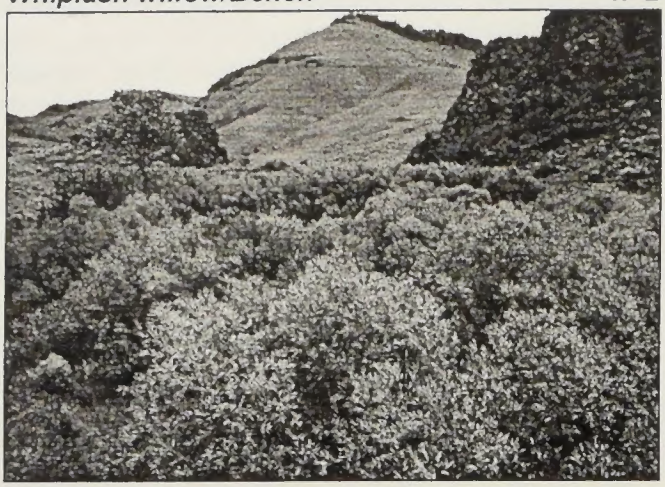
and Clausnitzer 1997, Hall and Hansen 1997). The dense root network of *Salix geyeriana* and understory *Carex* spp. stabilizes streambanks. This allows streambank undercutting which creates excellent fish and amphibian habitat (Hansen et al. 1995, Hall and Hansen 1997). Beaver ponds, often associated with *Salix geyeriana* associations, also provide excellent fish and waterfowl habitat.

CLASSIFICATION COMMENTS

Salix geyeriana/Mesic graminoid is a broad association, which may encompass *Salix geyeriana/Poa pratensis,* and other *Salix geyeriana* associations with no clearly dominant understory graminoid species. When ecological conditions are good, it has higher cover and constancy of *Calamagrostis canadensis, Carex* spp., and *Deschampsia cespitosa,* possibly causing confusion with *Salix geyeriana* associations named for dominance of any one of these species. More often, however, the *Salix geyeriana*/Mesic graminoid association is a grazing induced disclimax with high cover and constancy of increasers (Padgett et al. 1989, Kovalchik 1987, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). Thus, communities such as *Salix geyeriana/Poa palustris* and *Salix geyeriana/Poa pratensis* can be confused with *Salix geyeriana*/Mesic graminoid (Mutz and Queiroz 1983, Youngblood et al. 1985, Padgett et al. 1989). The broader *Salix geyeriana* association of Hansen et al. (1995) is characterized by more cover of mesic graminoids than mesic forbs and likely encompasses stands of *Salix geyeriana*/Mesic graminoid. In addition, *Salix geyeriana*/Mesic graminoid can be confused with mixed *Salix* associations and *Salix boothii* associations which share similar mesic graminoid understories. Youngblood et al. (1985) and Hansen et al. (1995), for example, lump stands co-dominated by *Salix boothii* within their *Salix geyeriana* associations.

Salix lasiandra/Bench

Whiplash willow/Bench **n=2**



RANGE

This association is known to occur in mountains of northeastern Nevada and along the northern edge of the Snake River Plain in southern Idaho.

ENVIRONMENT

This association occupies coarse-textured stream bars or benches along very low to moderate gradient streams. Valley bottoms are narrow to wide, although typically moderate (Manning and Padgett 1995). Throughout its distribution, elevations range from 4200 to 7500 feet. Most of these sites are flooded annually at high water, and some channels may run through the stands throughout the summer.

SOILS

Soils are mostly young and fluvial in origin and were classified as Xerofluvents and Udifluvents. The water table is usually deep (Manning and Padgett 1995).

VEGETATION COMPOSITION

Salix lasiandra dominates a dense, tall canopy up to 8 m in height. All other shrubs and the herbaceous component have low to moderate cover and constancy. *Rosa woodsii* is the most prominent associate, Most graminoids are confined to wet mircrosites or channels. Litter, bare soil and rock, and water comprise most of the ground cover.

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by sagebrush-steppe, pinyon-juniper, and *Cercocarpus ledifolius*. Adjacent riparian associations include those dominated by *Populus trichocarpa, Salix lasiolepis, S. exigua, S. lutea,* and *Cornus sericea.*

MANAGEMENT CONSIDERATIONS

This association is typically susceptible to heavy grazing. Because of dry surface soils, establishment of herbaceous species is limited. The coarse-textured soils lack sufficient vegetative cover and root density and are easily disturbed by livestock and other activities (Manning and Padgett 1995). *Salix* dominated associations in general, such as the *Salix lasiandra*/Bench association, function in a variety of capacities to promote stream health and enhance water quality. In this association, *S. lasiandra* forms dense root networks that stabilize streambanks against lateral cutting and erosion. It also provides cover in the form of overhanging branches, which effectively moderates extreme temperature fluctuations. The large stature of the willows in this association contributes large woody debris to the stream (Hall and Hansen 1997).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Cornus sericea	50	0.5	0	1
Prunus virginiana	50	10	0	20
Ribes aureum	50	1.5	0	3
Rosa woodsii	100	20.5	1	40
Salix lasiandra var. caudata	100	79	60	98
FORBS				
Circaea alpina	50	0.5	0	1
Cirsium vulgare	100	1	1	1
Epilobium glaberrimum	50	0.5	0	1
Euthamia occidentalis	50	1.5	0	3
Galium aparine	50	0.5	0	1
Geranium viscosissimum	50	0.5	0	1
Geum macrophyllum	50	0.5	0	1
Mimulus guttatus	50	0.5	0	1
Montia perfoliata	50	0.5	0	1
Ranunculus uncinatus	50	0.5	0	1
Rumex salicifolius	50	0.5	0	1
Stellaria media	50	5	0	10
Urtica dioica	50	1.5	0	3
GRAMINOIDS				
Carex athrostachya	50	0.5	0	1
Carex stipata	50	0.5	0	1
Deschampsia elongata	50	0.5	0	1
Poa pratensis	50	10	0	20
Puccinellia pauciflora	50	30	0	60
Scirpus microcarpus	50	5	0	10

SUCCESSIONAL DYNAMICS

Salix lasiandra colonizes coarse sand and gravel bars at low elevations. As these bars become elevated through accumulation of sediment, this species maintains dominance on these drier sites. Droughty surface soils and dense shade limit the undergrowth to a sparse herbaceous layer (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

The *Salix lasiandra*/Bench association provides browse and cover for moose, deer, birds, and small mammals. Beaver tend to utilize most species of willow (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

This association is quantitatively defined from Nevada by Manning and Padgett (1995) and supplemented with five plots from southern Idaho (e.g., Jankovsky-Jones 1996, Moseley 1999). The *Salix lasiandra*/Mesic forb association (Manning and Padgett 1995) also has a dense cover of *S. lasiandra,* but differs from the *S. lasiandra*/Bench by having a conspicuous herbaceous ground cover. Hall and Hansen (1995) described a broad *Salix lasiandra* association type from eastern Idaho, modeled after a similar Montana type (Hansen et al. 1995). At least some of their stands probably fall within the definition of the *S. lasiandra*/Bench type described by Manning and Padgett (1995).

Salix lasiandra/Cornus sericea

Whiplash willow/red-osier dogwood **n=3**

RANGE

In southwest Idaho, the *Salix lasiandra/Cornus sericea* plant association has been sampled at 2 sites in the foothills of the Boise Mountains; in the Boise Foothills, the Danskin Mountains and the North Fork Owyhee River (Moseley 1998, 1999). The *Salix lasiandra/Cornus sericea* plant association has also been observed along the Big Wood River in central Idaho (Jankovsky-Jones 1997a) and the Blackfoot River in southeastern Idaho (Jankovsky-Jones 1997c). It is expected to occur in northern Nevada, as well as throughout eastern Oregon, where similar communities have been documented (Manning and Padgett 1995, Oregon Natural Heritage Program 1999).

ENVIRONMENT

The *Salix lasiandra/Cornus sericea* plant association is found at low elevations in narrow to wide valley bottom floodplains of higher order perennial streams. Elevations range from 3570 to 6100 feet. It is found on low alluvial terraces and recently formed alluvial bars that are nearly always annually flooded during peak-flows. The streams include braided rivers leaving the foothills, narrow mountain streams, and canyon-bottom streams. Stream channels are typically 1 to 5 m wide, low to high gradient, and minimally entrenched (Moseley 1998, 1999).

SOILS

The association is found on rocky, gravelly, and sandy mixed alluvium. Sites that area scoured by floods annually have large amounts of exposed rock, sand, and gravel while non-scoured sites are covered by leaf litter (Moseley 1998, 1999).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Betula occidentalis	33	1.0	0	3
Cornus sericea	100	37.0	1	80
Ribes inerme	33	1.0	0	3
Rosa woodsii	67	1.3	0	3
Salix exigua	33	1.0	0	3
Salix lasiandra var. caudata	100	73.3	50	90
Salix lasiolepis	33	3.3	0	10
Salix lutea	100	17.7	3	40
FORBS				
Circaea alpina	33	1.0	0	3
Epilobium ciliatum	67	0.7	0	1
Urtica dioica	67	0.7	0	1
GRAMINOIDS				
Elymus glaucus	67	1.3	0	3
Scirpus microcarpus	67	0.7	0	1

VEGETATION COMPOSITION

The *Salix lasiandra/Cornus sericea* plant association is characterized by a tall-willow overstory of *Salix lasiandra* and tall-shrub understory of *Cornus sericea* and *Salix lutea*. *Salix lasiandra* dominates the overstory with 50 to 90% cover and averages over 4 m tall (Moseley 1998, 1999). *Cornus sericea*, with up to 80% cover, and *Salix lutea* (3 to 40% cover) form a dense tall-shrub understory. Other *Salix* spp. (e.g., *Salix lasiolepis, S. exigua*, and *S. bebbiana*) may be present as well as occasional *Betula occidentalis, Ribes inerme, Ribes aureum,* and *Rosa woodsii* (Moseley 1998 and 1999). The herbaceous understory is diverse but sparse due to shading by the shrub thicket and frequent flood scouring. No single graminoid species is prominent. The most constantly occurring graminoids, though with low cover, are *Elymus glaucus* and *Scirpus microcarpus* (Moseley 1998, 1999). Moss and lichen cover is sparse.

ADJACENT COMMUNITIES

A variety of other communities may be adjacent to the *Salix lasiandra/Cornus sericea* plant association. Trees, such as *Populus trichocarpa, Populus tremuloides*, or *Pseudotsuga menziesii,* often dominate adjacent riparian terraces. Various *Salix* spp. (e.g., *Salix exigua*, other *S. lasiandra* types, and *S. lasiolepis*) may also be adjacent. Neighboring upland slopes are usually dominated by mixed mountain shrubs, *Artemisia tridentata* var.

vaseyana/Agropyron spicatum, Pseudotsuga menziesii, or *Juniperus occidentalis* (Jankovsky-Jones 1997a,1997c, Moseley 1998, 1999).

MANAGEMENT CONSIDERATIONS

The dense shrub thicket formed by the *Salix lasiandra/Cornus sericea* plant association may limit livestock access (Manning and Padgett 1995). Due to dry surface soils, shade, and flood scouring, establishment of palatable mesic graminoid species is also limited. However, the coarse-textured soils lack sufficient vegetative cover and root density and are susceptible to disturbance by livestock and vehicles (Manning and Padgett 1995). Weedy exotic species, such as *Poa pratensis,* typically invade these disturbed soils. Overgrazing in this plant association will lead to decreased willow and *Cornus sericea* vigor, eventually eliminating these species from the site (USDA 2000).. Both *Salix lasiandra* and *Cornus sericea* are good candidates for restoration purposes. Although severe fires are rare in riparian settings, they can kill both *Salix lasiandra* and *Cornus sericea* roots, preventing re-sprouting (USDA 2000). After non-severe burns *Cornus sericea* often quickly increases beyond pre-fire levels.

SUCCESSIONAL DYNAMICS

The *Salix lasiandra/Cornus sericea* plant association is probably an early to mid-seral community. Both *Salix lasiandra* and *Cornus sericea* are early to mid-seral species colonizing frequently flooded coarse sand and gravel bars (Manning and Padgett 1995, Hall and Hansen 1997, USDA 2000). As bars elevate through floodplain development and stream down cutting, *Populus* or other species may eventually replace *Salix lasiandra* (USDA 2000). Tree establishment may indicate succession toward *Betula occidentalis, Alnus incana, Populus tremuloides,* or *Populus trichocarpa* dominated stands with *Cornus sericea* understories (Manning and Padgett 1995, Hall and Hansen 1997, Jankovsky-Jones 1997b, USDA 2000). Tall-shrub or tree canopies must be open enough to allow sufficient sun to reach understory *Cornus sericea* or else it will decrease in abundance (USDA 2000).

WILDLIFE FUNCTIONS

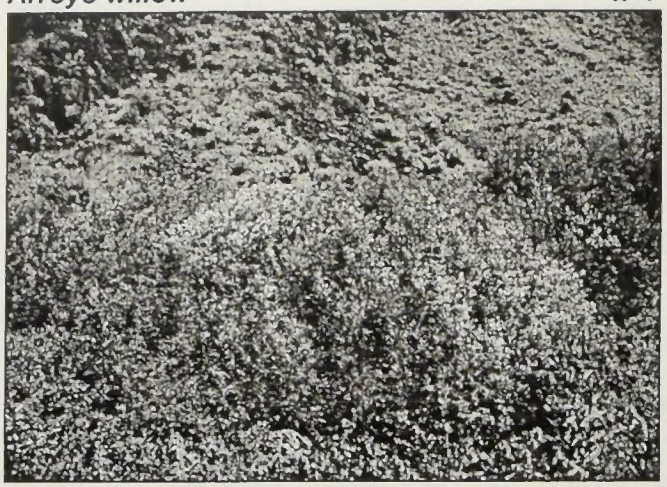
The *Salix lasiandra/Cornus sericea* plant association provides high quality browse and cover for moose, deer, elk, birds, and small mammals. Beaver also utilize *Salix lasiandra,* especially in the winter (Hall and Hansen 1997, USDA 2000). Moose relish *Cornus sericea* in the fall and winter. Songbirds, grouse, quail, partridge, other birds, and small mammals consume *Cornus sericea* fruits. The high structural diversity found in the *Salix lasiandra/Cornus sericea* plant association is excellent for songbird nesting (Manning and Padgett 1995). eaver, deer, and rodents eat the stems and bark of *Cornus.* The *Salix lasiandra/Cornus sericea* plant association promotes stream health and enhances water quality. Both species form dense root networks that stabilize streambanks against lateral cutting and erosion (Manning and Padgett 1995, Hall and Hansen 1997, USDA 2000). The shade of their overhanging branches effectively moderates water temperature fluctuations.

CLASSIFICATION COMMENTS

The *Salix lasiandra/Cornus sericea* plant association has not been previously described in other classifications. It is classified by only 3 plots from southwest Idaho (Moseley 1998, 1999) and 2 community observations from southeastern and central Idaho (Jankovsky-Jones 1997a, 1997b). The *Cornus sericea-Salix* spp. community type from northern Nevada is very similar, both structurally and compositionally, and closely related to this association (Manning and Padgett 1995). *The Salix exigua-Salix lasiandra-Cornus sericea/Eleocharis palustris* plant association from eastern Oregon is also similar, and may be successionally related (Oregon Natural Heritage Program 1999). In other classifications, some stands of the *Salix lasiandra/Cornus sericea* plant association have likely been lumped with other types such as the *Salix lasiandra* dominance type (Evans 1989, Hall and Hansen 1997) or the *Salix exigua*/barren community (Padgett et al. 1989).

Salix lasiolepis

Arroyo willow **n=7**



RANGE

The *Salix lasiolepis* dominance type was sampled at the Rocking M Ranch on low elevation tributaries to Brownlee Reservoir in southern Hells Canyon (Moseley 1999). It is expected to occur in adjacent Oregon. This plant association was also sampled in the Danskin Mountains and in the northern Owyhee Mountains (Moseley 1998). Similar *Salix lasiolepis* stands are expected to occur in northern and/or central Nevada. Dissimilar *Salix lasiolepis* dominance type stands are common in California (Sawyer and Keeler-Wolf 1995).

ENVIRONMENT

In southwest Idaho, the *Salix lasiolepis* dominance type is found only at low elevations ranging from 2150 to 4240 feet (Moseley 1998, 1999). *Salix lasiolepis* forms dense, but narrow, riparian stands on low alluvial terraces, active and old floodplains, and streambanks. Sampled stands were in narrow to moderate width valley bottoms (e.g., floodplains 10 to 30 m wide) along both intermittent and perennial streams (Moseley 1998, 1999). The streams are low to high gradient but channels are mostly narrow (e.g., 1 to 2 m wide). Although sites may or may not flood annually, these fluvial settings are often dynamic. Most sites show evidence of periodic very high peak flows such as extensive flood scouring, channel erosion, and deposition of alluvial bars or "levees" composed of large-sized rocks and coarse gravel (Moseley 1998, 1999).

SOILS

Soils are typically well-drained coarse gravel and cobble alluvium.

VEGETATION COMPOSITION

Stands in the *Salix lasiolepis* dominance type are clearly dominated by 2 to 4 m tall *Salix lasiolepis* with average cover of 54% (Moseley 1998, 1999). Early seral or disturbed stands have 10 to 20% *Salix lasiolepis* cover while older stands have 80 to 90% cover. Associated shrub diversity is high, but all species average less than 10% cover each. Occasional stands have a co-dominant shrub (e.g., *Cornus sericea, Salix exigua,* or *S. lutea*) but most do not. The most frequently occurring shrub is *Philadelphus lewisii* but always with 10% or less cover (Moseley 1998, 1999). *Artemisia tridentata* var. *tridentata*, commonly occurring on adjacent higher alluvial terraces, can be found on the drier fringes of *Salix lasiolepis* stands. *Clematis ligusticifolia* occasionally clambers through the shrub overstory. Due to disturbance and micro-site variability, the herbaceous understory is heterogeneous and often contains numerous weedy exotic species. Graminoids are common in the understory but no single species is consistently important. The most commonly observed species, in order of highest to lowest average cover values, are *Poa pratensis, Elymus glaucus, Bromus japonicus, Juncus ensifolius, Poa bulbosa, Agrostis stolonifera,* and *Polypogon monspeliensis* (Moseley 1998, 1999). Aquatic or wet-site graminoids, such as *Catabrosa aquatica, Eleocharis palustris, Glyceria* spp., and *Paspalum distichum*, are occasionally observed in stream channels. Like graminoids, forb diversity was high. The only forbs with notable cover and

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Clematis ligusticifolia	50	1.9	0	10
Cornus sericea	25	6.3	0	30
Crataegus douglasii	38	1.8	0	10
Philadelphus lewisii	25	3.8	0	20
Rosa woodsii	75	5.9	0	20
Salix lasiolepis	100	73.5	40	98
FORBS				
Epilobium ciliatum	63	0.9	0	3
FERNS				
Equisetum hyemale	25	2.9	0	20
GRAMINOIDS				
Poa pratensis	50	0.8	0	3
Bromus tectorum	38	0.4	0	1
Elymus glaucus	38	0.6	0	3

constancy are either weedy exotics (e.g., *Melilotus officinalis, Medicago lupulina, Xanthium strumarium, Lactuca serriola,* and *Rumex crispus*) or occupy stream channels (e.g., *Rorippa nasturtium-aquaticum, Veronica anagallis-aquatica,* and *Mimulus guttatus*) (Moseley 1998, 1999). *Equisetum* spp., especially *Equisetum arvense, Artemisia ludoviciana,* and *Galium aparine* are also sometimes noticeable. Early seral or disturbed stands have broken shrub canopies and, thus, much higher total cover of weedy herbaceous species.

ADJACENT COMMUNITIES

Populus trichocarpa, Betula occidentalis, Philadelphus lewisii, and *Salix* spp. (e.g., *Salix exigua* or *S. lutea*) can dominate riparian areas adjacent to the *Salix lasiolepis* dominance type. *Artemisia tridentata* ssp. *tridentata*, with a *Bromus tectorum* and *Poa bulbosa* understory, often dominates adjacent alluvial terraces and dry bars (Moseley 1998, 1999). *Artemisia tridentata*-steppe, *Agropyron spicatum*, or mixed mountain shrub communities are commonly found on steep neighboring hill or canyon slopes.

MANAGEMENT CONSIDERATIONS

Little is known about the response of *Salix lasiolepis* to management. *Salix lasiolepis* stands effectively bind coarse-textured soils and should be maintained for streambank stability (Manning and Padgett 1995). *Salix lasiolepis* has low palatability for livestock and it is commonly found on sites that are marginal for livestock forage production (Padgett et al. 1989, USDA 2000). However, livestock occasionally browse *Salix lasiolepis* and congregate in riparian zones. Unfortunately, the rocky alluvial soils often lack structural support and are easily eroded by excessive livestock use or vehicles. *Salix lasiolepis* spreads slowly but can be used for nursery stock (USDA 2000). It is not fire resistant but resprouts after fire or following above-ground removal by mechanical means.

SUCCESSIONAL DYNAMICS

Salix lasiolepis apparently colonizes recent alluvial bars and disturbed soil where it can form stable, long-lived communities (Manning and Padgett 1995, Oregon Natural Heritage Program 1999). It prefers droughty, coarse-textured soils where water is available at least early in the growing season (Padgett et al. 1989, Manning and Padgett 1995). However, the xeric surface soils, combined with overstory shading, overgrazing, and occasional flood disturbance, promote either a depauperate herbaceous layer or weed-dominated undergrowth. Understory shrubs, such as *Cornus sericea,* likely establish after conditions are stabilized by *Salix lasiolepis* (Oregon Natural Heritage Program 1999). One stand of the *Salix lasiolepis* dominance type in southwest Idaho had significant *Populus trichocarpa* and *Salix lutea* present, while another had *Cornus sericea* (Moseley 1999). These species may indicate the potential vegetation succession for the sites. In eastern Oregon, the presence of *Alnus incana* in some similar *Salix lasiolepis* stands may indicate a successional trend toward the *Alnus incana/Cornus sericea* plant association (Oregon Natural Heritage Program 1999).

WILDLIFE FUNCTIONS

Though palatability is generally low, *Salix lasiolepis* is considered a good browse species for deer in California (Padgett et al. 1989, USDA 2000). *Salix lasiolepis* stands often occur in arid or semi-arid environments at low elevation where riparian vegetation is scarce. Thus, they are very important habitat for terrestrial and avian wildlife species and shade streams for aquatic species (Padgett et al. 1989, Manning and Padgett 1995). Beaver have also been observed using stands of *Salix lasiolepis* (Moseley 1999). Associated shrubs also provide food and cover for wildlife, birds, and fish.

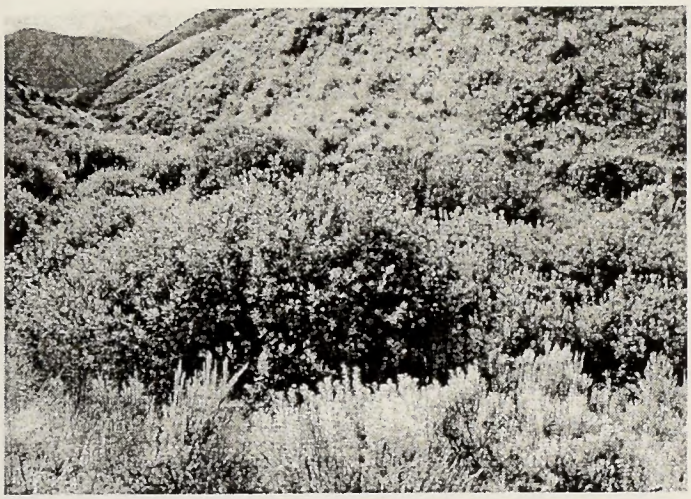
CLASSIFICATION COMMENTS

The heterogeneity characteristic of *Salix lasiolepis* stands poses challenges for clear classification. In southwest Idaho, 7 of 15 *Salix lasiolepis* stands analyzed did not clearly cluster with other known *Salix lasiolepis* types (e.g., *Salix lasiolepis*/Barren or *S. lasiolepis/Rosa woodsii*) (Moseley 1998, 1999). Other than *Philadelphus lewisii,* associated shrubs varied highly. Due to cattle and flood disturbance, the herbaceous understories of these 7 *Salix lasiolepis* stands were diverse but weedy. Thus, a general *Salix lasiolepis* dominance type was chosen to capture this variance. Further sampling may help define a *Salix lasiolepis/Philadelphus lewisii* plant association. Moseley (1999) tentatively classified some *Salix lasiolepis* stands as *Salix lasiolepis/Cornus sericea* or *Salix lasiolepis*/Mesic graminoid. Until additional data is collected, our analysis does not support classification of those tentative types. Overall, the distinctions between previously described types, such as *Salix lasiolepis*/barren, *S. lasiolepis*/bench, *S. lasiolepis/Rosa woodsii,* and *S. lasiolepis-Rosa woodsii-Cornus sericea/Clematis ligusticifolia*, are often fuzzy (Padgett et al. 1989, Manning and

Padgett 1995, Moseley 1998 and 1999, Oregon Natural Heritage Program 1999). These associations may represent different conditions along ecological and successional gradients.

Salix lasiolepis/Barren

Arroyo willow/Barren **n=8**



RANGE

This association occurs in southeastern Utah (Padgett et al. 1989), is scattered throughout Nevada (Manning and Padgett 1995), and is found in southwestern Idaho (Moseley 1998).

ENVIRONMENT

Elevations range from 2,500 feet in the north to over 7,000 feet in the south. Most stands occur on stream benches and low terraces in valley bottoms with narrow to moderate widths and low to high (typically moderate) gradients. The substrates are coarse textured and surface soils are usually dry. Most streams were A2 channels, but include also A3, B2, B3, C3, and D2 types (Padgett et al. 1989, Manning and Padgett 1995).

SOILS

Soils are mostly developed in alluvium and have xeric moisture regimes. They were classified as Xerofluvents, Xerochrepts, Udifluvents, Halumbrepts, and Haploxerolls, indicating the range in soil development. Soil texture classes include sandy-skeletal and fine-loamy. Water tables are deep, usually below the level of the soil pit, and no mottles were evident because of the coarse soil textures (Padgett et al. 1989, Manning and Padgett 1995). Some stands in Idaho were on well-drained residuum or colluvial material near springs.

VEGETATION COMPOSITION

Salix lasiolepis dominates a dense overstory. This shrub is highly branched from the base, with long sweeping stems that totally dominate the stand structure. *Ribes aureum, Rosa woodsii*, and other low shrubs occur in the stand, but always in low to moderate cover. The herbaceous understory is depauperate with a diversity of species, often weedy, occurring with low constancy and cover (Padgett et al. 1989, Manning and Padgett 1995).

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by sagebrush-steppe, pinyon-juniper, *Quercus gambelii,* and *Cercocarpus ledifolius.* Adjacent riparian associations include those dominated by *Populus trichocarpa, Salix exigua, S. lutea, Salix lemmonii, Alnus rhombifolia,* and *Cornus sericea.*

MANAGEMENT CONSIDERATIONS

For a summary of management information, see the description for the *Salix lasiolepis* dominance type.

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Clematis ligusticifolia	50	1.9	0	10
Cornus sericea	25	6.3	0	30
Crataegus douglasii	38	1.8	0	10
Philadelphus lewisii	25	3.8	0	20
Ribes aureum	50	0.8	0	3
Rosa woodsii	75	5.9	0	20
Salix lasiolepis	100	73.5	40	98
FORBS				
Artemisia ludoviciana	38	0.4	0	1
Epilobium ciliatum	63	0.9	0	3
Galium aparine	38	0.6	0	3
Lactuca serriola	38	0.4	0	1
Mimulus guttatus	50	0.5	0	1
Rumex crispus	38	0.4	0	1
Urtica dioica	38	0.6	0	3
Verbascum thapsus	50	0.5	0	1
FERNS/FERN ALLIES				
Equisetum hyemale	25	2.9	0	20
GRAMINOIDS				
Poa pratensis	50	0.8	0	3
Bromus tectorum	38	0.4	0	1
Elymus glaucus	38	0.6	0	3

SUCCESSIONAL DYNAMICS

Little is known about the successional status of this type. It appears to occur where soils are coarse-textured and water is available at least early in the growing season. The depauperate undergrowth is

likely indicative of dense shade coupled with xeric surface soils. *Pinus ponderosa* was a major component of one stand in the Spring Mountains of far southern Nevada and may represent a trend toward a conifer-dominated overstory in that stand (Padgett et al. 1989, Manning and Padgett 1995).

WILDLIFE FUNCTIONS

Salix lasiolepis is considered a good browse species for deer in California. This association often occurs where riparian zones are scarce and is very important for terrestrial and avian wildlife species (Padgett et al. 1989, Manning and Padgett 1995).

CLASSIFICATION COMMENTS

Quantitatively defined from Utah by Padgett et al. (1989) and Nevada by Manning and Padgett (1995), who called it *Salix lasiolepis*/Bench. The composition and structure of the vegetation, as well as physical and environmental features are similar. This is supplemented with eight plots from southwestern Idaho (Moseley 1999).

Salix lemmonii/Bench

Lemmon's willow/Bench **n=2**

RANGE

The *Salix lemmonii*/Bench plant association is known mainly from the northern Great Basin. It is especially common in the northeastern Sierra Nevada Mountains of California but also in the Santa Rosa and Jarbidge Mountains of Nevada (Manning and Padgett 1995). In Idaho it has been sampled in only one watershed in Idaho, the upper North Fork Owyhee River in the Owyhee Mountains (Moseley 1999). *Salix lemmonii* is reported from the Stanley Basin in central Idaho (Brunsfield and Johnson 1985), but plant associations dominated by this species have not been described. A similar plant association, *Salix lemmonii-Rosa woodsii/Artemisia douglasiana,* is found in eastern Oregon (Oregon Natural Heritage Program 1999).

ENVIRONMENT

The *Salix lemmonii*/Bench plant association is found as low as 6140 feet elevation in the Owyhee Mountains to as high as 9360 feet in the Great Basin (Manning and Padgett 1995, Moseley 1999). It is known from a variety of fluvial settings and soils. The plant association occupies low alluvial terraces, bars, and benches adjacent to intermittent or perennial streams (Manning and Padgett 1995, Moseley 1999). It is also found in abandoned channels of perennial streams (Manning and Padgett 1995) as well as in intermittent stream channels (Moseley 1999). Sites may or may not be flooded annually. Stream types include narrow intermittent streams in rocky canyons (e.g., North Fork Owyhee River), steep mountain streams, and low-gradient streams in wide montane valleys. Valley gradients are typically low (Manning and Padgett 1995). The *Salix lemmonii-Rosa woodsii/Artemisia douglasiana* plant association of eastern Oregon is also found on stream terraces but is at much lower elevations (2760 to 5650 feet) (Oregon Natural Heritage Program 1999).

SOILS

Soils are often well drained and coarse-textured (large amounts of cobble, gravel, and sand present) but are sometimes clayey (Manning and Padgett 1995, Moseley 1999).

VEGETATION COMPOSITION

The *Salix lemmonii*/bench plant association is characterized by very high cover of *Salix lemmonii* (typically around 60 to 80%) with low cover of understory shrubs (usually *Ribes inerme, Rosa woodsii,* and *Symphoricarpos oreophilus*) around willow bases (Manning and Padgett 1995, Moseley 1999). *Salix boothii, Alnus incana,* and *Salix geyeriana* are occasionally intermixed with *Salix lemmonii* (Manning and Padgett 1995). The herbaceous understory has high diversity of species with low cover. However, it lacks clear dominance by specific species or suites of species. The most important commonly associated graminoids are *Poa pratensis, Juncus orthophyllus, Carex microptera,* and *Agrostis* spp. (e.g., *A. exarata, A. scabra, A. stolonifera)* (Manning and Padgett 1995, Moseley 1999). The most important forbs are *Solidago* spp., *Achillea millefolium, Heracleum lanatum, Aster ascendens,* and *Thalictrum fendleri.* Other commonly associated species, with even less cover, include *Senecio* spp., *Potentilla gracilis, Veratrum californicum, Castilleja miniata, Artemisia ludoviciana,* and *Perideridia* spp. (Manning and Padgett 1995, Moseley 1999).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Rosa woodsii	100	1	1	1
Salix lemmonii	100	60	60	60
FORBS				
Achillea millefolium	100	1	1	1
Artemisia ludoviciana	100	1	1	1
Aster ascendens	100	6.5	3	10
Castilleja miniata	100	5.5	1	10
Heracleum lanatum	100	6.5	3	10
Mentha arvensis	100	1	1	1
Perideridia montana	100	1	1	1
Potentilla gracilis	100	2	1	3
Senecio pseudareus	50	1.5	0	3
Senecio serra	50	5	0	10
Solidago missouriensis	100	1	1	1
Veratrum californicum	100	2	1	3
GRAMINOIDS				
Agrostis exarata	100	2	1	3
Agrostis scabra	100	1	1	1
Juncus orthophyllus	100	5.5	1	10
Poa pratensis	100	5.5	1	10

ADJACENT COMMUNITIES

A wide variety of riparian communities are adjacent to *Salix lemmonii*/Bench plant associations. These

communities may be tree-dominated *Populus tremuloides* or *Alnus incana* types or willow-dominated (e.g., *Salix eastwoodiae, Salix boothii,* and *Salix exigua*) (Manning and Padgett 1995, Moseley 1999). Adjacent herbaceous-dominated riparian associations include *Artemisia ludoviciana, Carex utriculata,* and *Carex scopulorum* (Manning and Padgett 1995, Moseley 1999). Adjacent upland communities are dominated by *Pinus contorta, Pinus monticola, Cercocarpus ledifolius, Artemisia tridentata* ssp. *vaseyana*, and *Juniperus occidentalis.*

MANAGEMENT CONSIDERATIONS

Salix lemmonii is more palatable for sheep than cattle, however, cattle use may be significant due to riparian settings (USDA 2000). Though livestock movement can be impeded by the dense willow thickets, many *Salix lemmonii* stands show evidence of overuse by cattle (e.g., decreased willow vigor, "high-lining," "clubbing," and dead clumps) (Manning and Padgett 1995, USDA 2000). The coarse and well-drained soils of the *Salix lemmonii*/Bench plant association are less susceptible to compaction by livestock or vehicles than wetter, fine-textured soils (Manning and Padgett 1995). *Salix lemmonii* can re-sprout from its root crown after all but the most severe, slow-burning fires which kill sub-surface roots (USDA 2000). Although a quick, hot burn may rejuvenate *Salix lemmonii,* it may take two years to re-sprout and many more years to become resistent to browsing damage. *Salix lemmonii* cuttings or root clumps can be used for effective revegetation of streambanks (USDA 2000).

SUCCESSIONAL DYNAMICS

Salix lemmonii is an early seral species reproducing by seed and root or stem fragments on favorable alluvial soils (e.g., well-drained gravelly or sandy soils) (Brunsfeld and Johnson 1985, USDA 2000). The *Salix lemmonii*/bench plant association may have in the past, or may in the future, support denser herbaceous understories dominated by tall forbs or mesic graminoids (Manning and Padgett 1995). As stream channel migration, down cutting, and alluvium deposition occurs, surface moisture of benches may decrease. Consequently, herbaceous undergrowth will become sparser and composition will shift toward species preferring drier, better-drained soils (Manning and Padgett 1995). The *Salix lemmonii*/Bench plant association is apparently a stable community on such sites.

WILDLIFE FUNCTIONS

Salix lemmonii provides browse for deer and elk. Like other willows, it is a preferred food for beaver and moose and good habitat cover for songbirds, mammals, and salmonids (USDA 2000).

CLASSIFICATION COMMENTS

The classification of the *Salix lemmonii*/bench plant association is based on 10 plots from Nevada and adjacent California (Manning and Padgett 1995) and 2 plots from the North Fork Owyhee River in the Owyhee Mountains of Idaho (Moseley 1999). Communities dominated by *Salix lemmonii* are relatively common throughout eastern Oregon (Kovalchik 1987, Evenden 1989, Oregon Natural Heritage Program 1999) northern and western Nevada (Manning and Padgett 1995) but are usually separated by diagnostic understory mesic graminoid and forb species. In contrast, the understory of the *Salix lemmonii*/Bench plant association is noticeably sparse. The understory lacks any obviously or consistently dominant species or suite of species. The classification of *Salix lemmonii* communities is complicated by the common inclusion of other sub-dominant *Salix* species (especially *S. boothii* and *S. geyeriana*) (Kovalchik 1987, Manning and Padgett 1995). In addition, *Salix lemmonii* and *Salix geyeriana* can hybridize in the field, making identification difficult (Brunsfeld and Johnson 1985).

Salix lutea/Rosa woodsii

Yellow willow/wood's rose **n=3**

RANGE

Salix lutea/Rosa woodsii has been documented from the Trout Creek Mountains (Evenden 1989) and the Owyhee River canyon (Dean 1960) of southeastern Oregon. It has been observed throughout the mountains of Nevada (Manning and Padgett 1995) and from an adjacent area of southwestern Idaho.

ENVIRONMENT

This association is found in moderate V-shaped valleys at elevations ranging from 5,000 to 8,000 feet. Valley floor widths range from very narrow to very wide. Stream channels are generally narrow, with most being classified as B2, B3, or B4. Gradients are very low to moderate (up to 5%). Typically, it occurs on terraces and bars that are 2-3 feet above the adjacent stream channel (Dean 1960, Evenden 1989, Manning and Padgett 1995).

SOILS

Most soils are Cumulic Haploxerolls. Surface soil textures are variable, with sand and silt being the most commonly mentioned. The water table is usually deep during late summer, although it is certainly near the surface during high water in the spring. In some cases, such as the Owyhee canyons where annual water fluctuations are dramatic, this association can be flooded annually (Dean 1960, Evenden 1989, Manning and Padgett 1995).

VEGETATION COMPOSITION

Mature *Salix lutea* dominates this association, typically with a dry and open understory. *Rosa woodsii* is prominent in the understory of the willows, with *Rosa* and/or *Ribes aureum* usually have greater than 20% cover. *Ribes inerme* is also common. The ground cover is fairly open with greater than half of the surface unvegetated and covered with a light layer of leaf litter (Dean 1960, Evenden 1989, Manning and Padgett 1995).

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by sagebrush-steppe and pinyon-juniper woodlands. Adjacent riparian associations include *Cornus sericea* and other tall willow-dominated types.

MANAGEMENT CONSIDERATIONS

The sparse herbaceous understory provides little forage for livestock. Thickets of *Rosa woodsii* tend to preclude livestock access to the interior of these associations, although they may create access lanes through the stands. The erosion control potential for this association is high.

SPECIES	CON	COVER	MIN	MAX
TREES				
Alnus rhombifolia	33	1.0	0	3
Celtis reticulata	33	1.0	0	3
SHRUBS				
Betula occidentalis	67	4.3	0	10
Clematis ligusticifolia	67	2.0	0	3
Philadelphus lewisii	67	1.3	0	3
Ribes aureum	33	3.3	0	10
Rosa eglanteria	33	6.7	0	20
Rosa woodsii	67	7.0	0	20
Rubus idaeus	33	6.7	0	20
Salix lutea	100	80.0	70	90
Toxicodendron rydbergii	67	7.7	0	20
FORBS				
Galium aparine	67	1.3	0	3
Rumex crispus	67	1.3	0	3
Urtica dioica	67	1.3	0	3
Cirsium arvense	33	3.3	0	10
Mimulus guttatus	33	1.0	0	3
Taraxacum officinale	33	1.0	0	3
FERNS/FERN ALLIES				
Equisetum hyemale	33	1.0	0	3
GRAMINOIDS				
Poa pratensis	33	1.0	0	3

SUCCESSIONAL DYNAMICS

Manning and Padgett (1995) consider this type to be disturbance-induced in Nevada. *Salix lutea* establishes on periodically flooded stream bars that have shallow water tables. As the floodplain

continues its development and the stream becomes incised, the understory shifts to xeric species. *Rosa woodsii* and *Ribes aureum* often increase in response to eavy livestock grazing. The high cover of *Rosa* may not indicate past heavy grazing in all cases. One occurrence in Idaho is in a rugged canyon that has limited livestock use.

WILDLIFE FUNCTIONS

High *Rosa woodsii* cover provides habitat and forage for small wildlife and avian species. Forage value ratings for *Rosa* are high for mule deer (Manning and Padgett 1995).

CLASSIFICATION COMMENTS

This association is quantitatively defined from Oregon (Evenden 1989), Nevada (Manning and Padgett 1995), and southwest Idaho (Moseley 1999). Stands are also qualitatively described from Oregon by Dean (1960). Manning and Padgett (1995) included *Salix boothii* in their "*Salix lutea* group" because of identification difficulties, and its dominance in some of the stands they used to describe this type.

MISCELLANEOUS TALL SHRUB PLANT ASSOCIATIONS

Ribes aureum

Golden currant

(1 community observation)

Stands of the tentatively classified *Ribes aureum* plant association were observed on high alluvial terraces and islands of the lower Payette River at Birding Island (Jankovsky-Jones et al. 2000). *The Ribes aureum* plant association, or dominance type, has not been previously described, though the *Ribes odoratum* type described from southeastern Idaho by Hall and Hansen (1997) is possibly synonymous. The *Ribes aureum* type appears most similar to the *Rosa woodsii* plant association described by Manning and Padgett (1995) in Nevada. It is probably an early seral community colonizing disturbed soils (in this case disturbed from historic livestock grazing and flood scouring) on drier riparian sites. On the Payette River, *Salix exigua, Salix lutea, Populus trichocarpa*, or dry graminoid associations are expected to form later seral types on the site. The *Ribes aureum* stands on the Payette River occupied well drained sandy silt loam soils on sites that do not flood every year (only in large runoff events). However, evidence of occasional flood scouring was present. *Ribes aureum* was dominant with 20 to 40% cover. A few other shrubs were present (with low cover) including *Amorpha fruticosa, Rosa woodsii* (the most common associate), *Salix exigua*, and *Toxicodendron rydbergii* (Jankovsky-Jones et al. 2000). The *Ribes aureum* plant association was located in a large gap between *Populus trichocarpa* and *Salix exigua* stands. The understory was relatively sparse but weedy. The most common graminoids, all with low cover, were *Agrostis scabra*, annual *Bromus* spp., *Carex lanuginosa, Cyperus* spp., *Echinochloa crus-galli, and Phalaris arundinacea*. The most common forbs, also with low cover, were *Achillea millefolium, Artemisia ludoviciana, Barbarea orthoceras, Conyza canadensis, Equisetum laevigatum, Euthamia occidentalis, Grindelia squarrosa, Polygonum aviculare, Smilacina* spp., and *Solidago gigantea* (Jankovsky-Jones et al. 2000). Another *Ribes aureum* dominated stand was noted in south central Idaho in the Snake River Canyon at Vineyard Lake. It was dominated by *Ribes aureum* with a *Toxicodendron rydbergii* understory (Jankovsky-Jones et al. 2000).

Prunus emarginata

Bittercherry

(1 plot)

The tentatively classified *Prunus emarginata* dominance type was sampled with one plot on the Rocking M Ranch at Dennett Creek (a tributary to the Snake River on Brownlee Reservoir in southern Hells Canyon) (Moseley 1999). It was found on mixed alluvial soils along a streambank at 4,080 feet elevation. The valley bottom of this moderate gradient, perennial stream is narrow and shaped by occasional large-scale floods. However, evidence of flooding was not noted. In the Owyhee Mountains and elsewhere in southwestern Idaho, *Prunus emarginata* occasionally dominates large patches of the mountain shrub mosaic on moist upland sites, such as toe-slope basins or in the lee of rim-rock or ridges where snowdrifts are retained (Rust et al. 2000). *Prunus emarginata* is shade intolerant, often found as a seral species on disturbed sites, and generally prefers well-drained soils (USDA 2000). It follows that the riparian *Prunus emarginata* dominance type is most likely to be found in xero-riparian conditions at the riparian-upland interface. *Prunus emarginata* often extends up adjacent upland slopes that are dominated by mountain shrubs, *Pseudotsuga menziesii, Juniperus occidentalis*, and *Agropyron spicatum* grassland. The *Prunus emarginata* stand sampled was dominated by mature, 6 m tall *Prunus emarginata* with 50% cover (Moseley 1999). Other sub-dominant shrubs with 20% cover each were *Philadelphus lewisii* and *Rosa woodsii*. Shrubs indicative of drier conditions, such as *Acer glabrum, Physocarpus malvaceus, and Spiraea betulifolia*, were also notable. Several native herbaceous species dominated the heterogeneous understory, including *Arnica cordifolia, Elymus glaucus, Osmorhiza chilensis*, and *Smilacina stellata*, each with 10 to 20% cover (Moseley 1999). Weedy ephemeral annuals (e.g., *Galium aparine, Montia perfoliata*, and *Stellaria media*) were also common. Exotic species, such as *Cirsium vulgare* and *Poa pratensis*, were widespread reflecting the amount of historic livestock grazing at the site.

Salix exigua/Mesic forb

Sandbar willow/mesic forb

(1 community observation)

The *Salix exigua*/Mesic forb plant association was observed on the Boise River but not sampled with plots at any of the reference areas (Jankovsky-Jones et al. 2000). It is occasionally observed throughout

southern Idaho along major river systems, such as the Snake, Henry's Fork, and Boise rivers, but is also known from smaller creeks throughout the state (Jankovsky-Jones 1996, Jankovsky-Jones et al. 2000). The compositional heterogeneity inherent in early seral, flood-disturbed *Salix exigua* stands has led some researchers to lump stands into a *Salix exigua* dominance type (e.g., Hansen et al. (1995) in Montana; Crowe and Clausnitzer (1997) in eastern Oregon; Hall and Hansen (1997) in southeast Idaho; Crawford (2000) in eastern Washington). The *Salix exigua*/Mesic forb plant association, however, has been defined by researchers in southeast Oregon (Evenden 1989), southeast Idaho and Utah (Padgett et al. 1989), and Nevada (Manning and Padgett 1995, Weixelman et al. 1996). The stand observed in southwest Idaho is from a lower elevation riverine habitat and differs significantly in mesic forb composition from these other *Salix exigua*/Mesic forb descriptions. It is most similar to the *Salix exigua*/mixed riparian forb plant association documented along the middle Snake River by Cole (1996). The observed stand was characterized by an open stand of *Salix exigua* with 20% cover and sub-dominant *Salix lutea* (Jankovsky-Jones et al. 2000). The understory was dominated by *Lythrum salicaria*, an exotic species. However, numerous native mesic forbs, including *Epilobium ciliatum, Euthamia occidentalis, Verbena hastata, Lycopus asper*, and *Typha latifolia*, each had 2 to 5% cover. Total graminoid cover was low and only *Echinochloa crus-gallii* and *Poa pratensis* were notable (3% cover each). The soil was mixed alluvium and the site floods yearly. *Salix exigua*/Mesic forb sites may be wetter and less stable than some *Salix exigua*/Mesic graminoid stands but is more stable than the flood-scoured Salix exigua/Barren type (Manning and Padgett 1995). This plant association is probably common along the lower Snake (e.g., Glenns Ferry to Weiser), Boise, Payette, and Weiser rivers. The main indicator species are *Salix exigua, Euthamia occidentalis*, and *Lythrum salicaria*, but other forbs, both exotic weeds and native species, are expected.

Salix exigua/Poa pratensis

Sandbar willow/Kentucky bluegrass

(1 plot)

A small, variable stand of *Salix exigua* was sampled in the Black Leg Box Canyon exclosure in southern Owyhee County. This may represent the *S. exigua/Poa pratensis* community type described from central Oregon, eastern Idaho, western Wyoming, and throughout Utah (Norton et al. 1981, Youngblood et al. 1985, Padgett et al. 1989, Jankovsky-Jones 1996, 1997c). A dense stand of *Salix exigua* occurred on small bars along a small, incised stream. *Poa pratensis, P. palustris*, and *Eleocharis palustris* had equal cover (ca. 10%) in an otherwise sparse understory. This may be a grazing induced version of the *S. exigua*/Mesic forb or *S. exigua*/Mesic graminoid association, or alternatively, the result of increased graminoid cover in the *S. exigua*/Barren type (Youngblood et al. 1985, Padgett et al. 1989). The latter scenario appears to fit the Black Leg stand. More samples are needed in southwestern Idaho to determine the identity of stands with confidence.

Salix exigua/Rosa woodsii

Sandbar willow/Wood's rose

(2 community observations)

The *Salix exigua/Rosa woodsii* plant association was observed twice on the Owyhee Plateau of southwest Idaho, but not sampled at any reference areas (Rust et al. 2000). Both times it was observed on alluvial point bars and terraces along low gradient perennial streams that incise canyons in the volcanic plateau (e.g., Sheep Creek canyon and at Grasmere). Manning and Padgett (1995) and Weixelman et al. (1996) describe the *Salix exigua/Rosa woodsii* plant association in Nevada from stands in various fluvial settings. Other researchers have probably lumped stands of *Salix exigua/Rosa woodsii* into the *Salix exigua* dominance type (e.g., Hansen et al. 1995). Because *Rosa woodsii* is often an increaser in heavily grazed riparian areas, *Salix exigua/Rosa woodsii* is probably a grazing induced disclimax plant association replacing degraded *Salix exigua*/Mesic graminoid or *Salix exigua*/Mesic forb communities (Weixelman et al. 1996). Alternatively, it may be a drier *Salix exigua* type found at the margins of riparian areas on better-drained soils. Nevertheless, because *Salix exigua* and *Rosa woodsii* are both highly competitive, the plant association appears stable and long-lasting on suitable sites (Manning and Padgett 1995). Both stands of *Salix exigua/Rosa woodsii* observed on the Owyhee Plateau were characterized by an impenetrable thicket of 2 to 4 m tall *Salix exigua* (40 to 60% cover) with 50 to 70% cover of 2 m tall Rosa woodsii (Rust et al. 2000). *Ribes aureum* was also prominent. Other shrubs, including *Alnus incana, Artemisia tridentata* ssp. *tridentata, Cornus sericea, Prunus virginiana, Ribes inerme, Salix geyeriana*, and *S. lutea* were sometimes present in low amounts. The herbaceous understory of both stands was

heterogeneous but no single species had more than 15% cover in either stand. The most commonly observed graminoid species were *Elymus cinereus, Carex* spp. (e.g., *Carex lanuginosa, C. sheldonii*, and *C. athrostachya*), *Poa pratensis, Agrostis stolonifera,* and *Eleocharis palustris* (in order of importance) (Rust et al. 2000). The most common forbs were *Achillea millefolium, Cirsium arvense, Equisetum arvense, Galium triflorum, Senecio serra, Smilacina stellata*, and *Urtica dioica*. In general, the herbaceous understories had numerous exotic weedy species and trails indicative of long periods of livestock grazing. Both stands were located on sandy, silty, and gravelly alluvium, but the sites were not annually flooded (Rust et al. 2000). *Artemisia tridentata* ssp. *tridentata/Elymus cinereus* stands were on drier adjacent alluvial terraces.

Salix geyeriana-Salix boothii/Rosa woodsii

Geyer's willow-Booth's willow/Wood's rose
(2 community observations)

Two observations of this tentatively classified plant association were made in the Three Creek drainage on the Owyhee Plateau (Rust et al. 2000). No plots of this plant association were sampled at reference areas. It is most similar to the *Salix/Rosa woodsii* and the *Salix boothii/Rosa woodsii* plant associations known from Nevada by (Manning and Padgett 1995, Weixelman et al. 1996). The *Salix geyeriana-Salix boothii/Rosa woodsii* plant association appears closely aligned with *Salix boothii/Poa pratensis* (Youngblood et al. 1985) which represents grazing disturbed stands on slightly drier sites than other *Salix geyeriana* or *Salix boothii* types. Crowe and Clausnitzer (1997) described a similar *Salix/Poa pratensis* community with *Rosa woodsii* in eastern Oregon. Other researchers have probably lumped stands of *Salix geyeriana-Salix boothii /Rosa woodsii* into the *Salix geyeriana* or *Salix boothii* dominance types (e.g., Hall and Hansen 1997). *Salix boothii* is slightly more tolerant of prolonged grazing and altered hydrologic conditions than *Salix geyeriana*; its co-dominance in the Owyhee stands may reflect these disturbances (Hall and Hansen 1997). *Rosa woodsii* is often an increaser in heavily grazed riparian areas (Manning and Padgett 1995), thus *Salix geyeriana-Salix boothii/Rosa woodsii* is probably a grazing induced disclimax plant association. It probably replaces degraded *Salix geyeriana* or *Salix boothii* stands with mesic graminoid or mesic forb understories (e.g., Youngblood et al. 1985, Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996). More sampling with plots in *Salix geyeriana* or *Salix boothii* spp./*Rosa woodsii* stands is necessary to adequately describe this plant association. The *Salix geyeriana-Salix boothii/Rosa woodsii* stands observed in Three Creek were dominated by 2 to 5 m tall *Salix geyeriana* (20 to 60% cover) with co-dominant Salix boothii (10 to 35% cover) and lesser amounts of *Salix exigua* and *Salix lasiandra*. *Rosa woodsii* had significant cover (20 to 50%) and was distributed in a patchy pattern. Other common shrubs were *Ribes aureum* and *Cornus sericea*. The herbaceous understory was dominated by a variety of mesic graminoid species, most with low cover, including *Agrostis stolonifera* (abundant), *Alopecurus aequalis, Carex nebrascensis, Deschampsia elongata, Eleocharis palustris, Glyceria spp., Juncus* spp., *Poa palustris, P. pratensis* (abundant), and *Scirpus microcarpus*. There were also numerous mesic forbs, also with low cover. The most common species were *Achillea millefolium, Cicuta douglasii, Cirsium* spp., *Geum macrophyllum, Senecio hydrophilus, Thermopsis rhombifolia,* and *Urtica dioica*. The average elevation of the two observed stands was 5480 feet. Both stands were located in moderate width, flat-bottomed, and shallow canyons cut into the volcanic plateau by Three Creek. They were located on gravelly alluvial terraces, bars, and channel banks of the low gradient, perennial stream. Due to excessive cattle grazing, the stream was down cutting in several spots and over-widened in others.

Salix lasiandra/Mesic forb

Whiplash willow/Mesic forb
(2 community observations)

The *Salix lasiandra*/Mesic forb plant association was observed twice on the Payette River at Montour. Though not sampled at any reference areas, this low elevation community (2505 feet) is probably also found on the lower Boise, Snake, and Weiser rivers in southwest Idaho. The plant association is known from higher elevations across the Snake River Plain of Idaho (Jankovsky-Jones 1996, 1997c) and Nevada (Manning and Padgett 1995, Weixelman et al. 1996). Similar communities, such as the *Salix lasiandra*/Mesic graminoid-forb from southeastern Oregon (Evenden 1989) and the *Salix lasiandra* dominance type from Montana and southeast Idaho (Hansen et al. 1995, Hall and Hansen 1997), have also been described. Stands of *Salix lasiandra*/Mesic forb were dominated by 2 to 6 m tall *Salix lasiandra* which had moderate cover

(Jankovsky-Jones et al. 2000). Other common shrubs, all with low cover, were *Amorpha fruticosa, Ribes aureum, Rosa woodsii*, and *Salix* spp. (e.g., young *Salix alba, S. exigua*, and *S. lutea*). *Equisetum arvense, E. hyemale, Euthamia occidentalis*, and *Solidago gigantea* were all abundant while weedier forbs, including *Aster ascendens, Chenopodium botrys, Epilobium ciliatum, Gnaphalium palustre, Polygonum hydropiper, Solanum dulcamara*, and *Xanthium strumarium*, were also common. *Eleocharis palustris* was the most common graminoid, although *Agrostis repens, Carex lanuginosa, C. lenticularis, Juncus* spp. *Leersia oryzoides, Phalaris arundinacea*, and *Scirpus* spp. (e.g., *Scirpus microcarpus* and *S. pallidus*) were also noticeable. The stands observed were on annually flood-scoured alluvial bars, islands, and riverbanks with shallow sandy soils over river cobble. Stands were slightly more stable than adjacent *Salix exigua*/Barren stands. The presence of *Populus trichocarpa* seedlings in both stands observed indicate the likely successional trend (Jankovsky-Jones et al. 2000).

Salix lutea/Poa pratensis

Yellow willow/Kentucky bluegrass
(3 plots)

This is a grazing-induced community type first described from Nevada (Manning and Padgett 1995) and later documented from southeastern Idaho (Jankovsky-Jones 1997b). Three plots were sampled that appear to fit this type, two on the Rocking M in Hells Canyon and one along the Nevada border at Flat Creek. Stands sampled tended to be rather heterogeneous, with *Salix lutea* being prominent and sometimes dominant, but always with a mixture of other tall shrubs having high cover, such as *Salix exigua, S. lasiandra, S. lasiolepis, S. boothii*, and *Betula occidentalis*. Perennial grass cover ranged from 30% to 60% and *Poa pratensis* was always prominent. Forb cover was also high, ranging from 20% to 60%, often containing weedy species. Some of the native forbs that had high cover included *Solidago canadensis* and *Equisetum arvense*. This is probably a widespread type.

Salix lutea/Barren

Yellow willow/Barren
(2 community observations)

The *Salix lutea*/Barren plant association is a tentative type observed on the Boise River (e.g., Barber Pool) (Jankovsky-Jones et al. 2000). It was not sampled at any reference areas. Though formerly undescribed, it is most similar to the *Salix exigua*/Barren plant association (e.g., Padgett et al. 1989, Moseley 1998), within which stands of *Salix lutea* are sometimes lumped, and the *Salix lutea* dominance type described by Crowe and Clausnitzer (1997) for eastern Oregon. The *Salix lutea*/Barren plant association is characterized by thickets of young *Salix lutea* intermixed with lesser amounts of *Salix exigua, Populus trichocarpa* (seedlings and saplings), *Betula occidentalis, Salix lasiandra*, and *Rosa woodsii* (in order of importance) (Jankovsky-Jones et al. 2000). The annual flood scouring and deposition of coarse alluvium that these stands experience keep the herbaceous understory sparse in total cover but diverse in species (especially early seral species). The most common species include *Carex lanuginosa, Euthamia occidentalis, Agrostis scabra, Muhlenbergia richardsonis, Juncus* spp., *Panicum capillare, Artemisia ludoviciana*, and *Eragrostis pectinacea* (in order of importance) (Jankovsky-Jones et al. 2000). Other species commonly seen but with only trace cover, include *Cyperus* spp., *Eleocharis palustris, Gnaphalium palustre, Polygonum* spp., *Potentilla biennis, Rumex crispus*, and *Solidago canadensis*. The *Salix lutea*/Barren plant association is found on recently deposited sand, gravel, and cobble alluvium of point bars, channel banks, and islands. This type is expected to occur in similar fluvial settings on the Snake, Payette, Weiser, and other rivers and streams of southwest Idaho.

Salix lutea/Bench

Yellow willow/Bench
(3 community observations)

Several stands of *Salix lutea* on the lower Boise, Payette, and Snake rivers were observed on high alluvial bars and benches, as well as on banks of backwater sloughs, swales, flood channels, and ditches, at or slightly above the average annual high water line (Jankovsky-Jones et al. 2000). These fluvial settings either flood each year for short periods with minimal scouring or only flood in very high flow years. These sites are relatively stable due to inconsistent flooding and the sandy loam soils, occasionally with much gravel and cobble, are well drained. The vegetation is heterogeneous and somewhat weedy, reflecting both slightly drier wetland conditions and historic grazing disturbance. The fluvial settings and heterogeneous vegetation of these stands fit best with the *Salix lutea*/Bench plant association described by Manning and Padgett

(1995) in Nevada, though these stands in southwest Idaho are from much lower elevations (below 2800 feet) (Jankovsky-Jones et al. 2000). The stands observed in Idaho do not align well with moister *Salix lutea* plant associations (e.g., *Salix lutea*/Mesic graminoid and *S. lutea*/Mesic forb described by Manning and Padgett (1995) and Weixelman et al. (1996)). They are more closely related to *the Salix lutea/Rosa woodsii* (Evenden 1989, Manning and Padgett 1995, Oregon Natural Heritage Program 1999) and *Salix lutea/Poa pratensis* (Manning and Padgett 1995, Weixelman et al. 1996) plant associations but lack consistently high cover of those understory indicator species. It is likely that some stands of *Salix lutea*/Bench have been lumped into the more general *Salix lutea* dominance type by other researchers (e.g., Youngblood et al. 1985, Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997, Moseley 1998). The *Salix lutea*/Bench plant association observed on the Boise and Payette rivers was dominated by 30 to 70% cover of 3 to 5 m tall *Salix lutea* (Jankovsky-Jones et al. 2000). *Populus trichocarpa* saplings and seedlings were always present, indicating likely succession to the *Populus trichocarpa/Salix lutea* plant association (Manning and Padgett 1995, Moseley 1999, Jankovsky-Jones et al. 2000). Numerous other species of shrubs and young trees were present, each with varying cover ranging from trace to 30%, including *Alnus incana, Amorpha fruticosa, Betula occidentalis, Ribes aureum, Rosa canina, R. woodsii, Salix alba, S. amygdaloides, S. exigua, S. lasiandra*, and *Toxicodendron rydbergii*. The herbaceous understory was highly variable but total cover usually high. The most common graminoids, in order of importance, were *Carex lanuginosa, Agrostis stolonifera, Phalaris arundinacea, Carex athrostachya, Poa pratensis, Juncus* spp. (e.g., *Juncus effusus, J. ensifolius, J. tenuis*), *Echinochloa crus-galli, Muhlenbergia* spp., and *Bromus tectorum*. In general, mesic forb cover was greater than that of mesic graminoids. The most common forbs, in order of importance, were *Euthamia occidentalis, Equisetum* spp., *Solidago* spp., *Lythrum salicaria, Artemisia ludoviciana, Apocynum cannibinum, Smilacina racemosa, Solanum dulcamara*, and *Epilobium ciliatum* (Jankovsky-Jones et al. 2000).

Plant Associations Expected to Occur or Noted but Not Sampled

Various riparian tall shrub plant associations are expected to occur in the study area but were not sampled or observed. These include drier xeroriparian associations dominated by *Amelanchier alnifolia*, *Celtis reticulata*, *Rhus glabra*, and *Rosa woodsii* (Evans 1989, Crowe and Clausnitzer 1987, Manning and Padgett 1995, Crawford 2000). Surprisingly, no positively classified *Alnus incana* plant associations were sampled, although they are expected (Crowe and Clausnitzer 1997, Moseley 1998). Other iterations of *Betula occidentalis*, *Crataegus douglasii*, *Ribes* spp. (e.g., *Ribes hudsonianum* or *R. inerme*), and *Salix* spp. dominated associations are also expected (Crowe and Clausnitzer 1997, Oregon Natural Heritage Program 1999). Montane or subalpine *Salix* spp. plant associations were not surveyed as part of this study. Several human-induced plant associations dominated by exotic tall shrubs were noted, but not sampled, at low elevation sites on the lower Boise, Payette, and Snake rivers (including southern Hells Canyon). These tall shrub species included *Amorpha fruticosa, Malus pumila, Prunus cerasifera* (or other exotic *Prunus* spp.), and *Rubus discolor* (Evans 1989, Johnson 1995, Jankovsky-Jones et al. 2000).

Artemisia cana ssp. viscidula/Dry graminoid

Silver sagebrush/Dry graminoid **n=6**

RANGE

Known from the Owyhee uplands of extreme southwestern Idaho (Moseley 1999) and south to central Nevada (Manning and Padgett 1995).

ENVIRONMENT

This association occupies seasonally moist sites in broad meadows with perennial streams or low terraces along intermittent drainageways. Valley bottom gradients are generally low and stands can occur in narrow to very broad valleys.

SOILS

Most soils have thick mollic epipedons or other indicators of advanced soil development and included Haploxerolls, Cryoborolls, and Argixerolls. Soil particle sizes were variable and included clayey, clayey-skeletal, coarse-loamy, and loamy-skeletal (Manning and Padgett 1995).

VEGETATION COMPOSITION

Artemisia cana is the only shrub with any significant cover. *Rosa woodsii* is the only other shrub likely to occur in stands. The understory consists of a variety of drier-site grasses and grass-like species, typically none of which clearly dominate this herbaceous layer. *Carex douglasii, Juncus balticus, Sitanion hystrix* var. *hordoides,* and *Agropyron trachycaulum* have high constancy. Some of the other graminoids that occur in these stands include several native *Poa* spp. *(P. fendleriana, P. nevadensis, P. cusickii), Juncus* spp. *(J. tenuis, confusus), Stipa* spp., *Elymus triticoides, Muhlenbergia richardsonis, Hordeum brachyantherum,* and *Festuca idahoensis.* One stand on a well-drained bar along an intermittent drainage in Idaho has high cover of *Agropyron spicatum,* although several of the species mentioned above were also present. Although there was a high diversity of forbs in the Idaho stands, none had high constancy or more than trace cover. *Achillea millefolium, Taraxacum officinale,* and *Potentilla gracilis* had high constancy in Nevada. Similar to Idaho, forbs generally had low cover (Manning and Padgett 1995, Moseley 1999).

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by *Pinus contorta*, pinyon-juniper, *Artemisia tridentata* ssp. *vaseyana* and ssp. *wyomingensis*, and *Artemisia arbuscula.* Adjacent riparian associations include those dominated by *Artemisia ludoviciana, Artemisia tridentata* ssp. *tridentata*, mesic graminoids, and tall willows.

MANAGEMENT CONSIDERATIONS

Erosion control potential for this association ranges from moderate to high for most associated species. Trampling sites with fine-textured soils leads to compaction and/or surface erosion. Graminoid associates are desirable forage and management should favor these species. Fire will increase *Artemisia cana* cover, which not only sprouts from the base, but also reproduces vegetatively from underground stems (Manning and Padgett 1995).

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Artemisia cana	100	36.7	20	60
FORBS				
Epilobium brachycarpum	67	0.7	0	1
Gnaphalium palustre	50	0.5	0	1
Epilobium pygmaeum	33	5.2	0	30
Psilocarphus brevissimus	33	1.8	0	10
Trifolium macrocephalum	33	1.8	0	10
GRAMINOIDS				
Poa nevadensis	100	16.7	1	50
Sitanion hystrix var hordeoides	67	4.5	0	10
Agropyron spicatum	17	5.0	0	30
Carex douglasii	17	1.7	0	10

SUCCESSIONAL DYNAMICS

Although this association is on stable sites, livestock overgrazing shifts undergrowth composition to early

seral species. The common occurrence of *Achillea millefolium, Helenium hoopesii, Iris missouriensis, Potentilla gracilis,* and *Taraxacum officinale* indicates past heavy grazing. These highly productive sites attract livestock, reducing vigor and cover of palatable species such as *Poa nevadensis, P. cusickii, P. fendleriana, Agropyron trachycaulum, Festuca idahoensis,* and *Elymus triticoides.* Competitive low seral forbs typically colonize disturbed stands (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

For information on use by wildlife, see the *Artemisia cana/Festuca idahoensis* description.

CLASSIFICATION COMMENTS

This association is quantitatively defined from Nevada by Manning and Padgett (1995). Stands were also sampled in southwestern Idaho (Moseley 1999). This plant association is similar to the *Artemisia cana/Festuca idahoensis* type described from mountainous regions farther north and east where *Festuca idahoensis* is the characteristic herbaceous dominant, whereas most of Manning and Padgett's (1995) and Moseley's (1999) stands had a mixture of other grasses and graminoids as dominants. However, Manning and Padgett's (1995) stands from extreme northern Nevada (Jarbidge Mountains area) may include some stands that would be placed in the *A. cana/F. idahoensis* type. The remaining Nevada and southwestern Idaho stands appear the same.

Artemisia cana ssp. viscidula/ Festuca idahoensis

Silver sagebrush/Idaho fescue **n=2**

RANGE

This type occurs in central and southwestern Montana (Mueggler and Stewart 1989, Hansen et al. 1995), western Wyoming (Bramble-Brodahl 1978, Mutz and Graham 1982, Youngblood et al. 1985), and central and eastern Idaho (Schlatterer 1972, Tuhy 1981, Tuhy and Jensen 1982, Hironaka et al. 1983, Mutz and Queiroz 1983, Youngblood et al. 1985, Jankovsky-Jones 1996, 1997c). Several sites have recently been sampled in Owyhee County. This type may also extend into Colorado (Youngblood et al. 1985).

ENVIRONMENT

Throughout its distribution, this association represents the driest extreme of the riparian zones, and not all *Artemisia cana* sites are considered wetlands. Stands of *Artemisia cana/Festuca idahoensis* are found on alluvial benches, toeslopes, seeps, and broad basins. This association is tolerant of imperfect drainage, high water tables, and periodic flooding. Available water is moderate (Youngblood et al. 1985, Hansen et al. 1995).

SOILS

Soils are silty to sandy loams, often with coarse fragments. Redox concentrations (mottles) are common and indicate a fluctuating water table. Soil reaction ranges from slightly acid to moderately alkaline (pH 6.0 to 8.0).

VEGETATION COMPOSITION

Artemisia cana is usually the only species in a conspicuous low shrub stratum. On the moist extreme, *Pentaphylloides floribunda* may grade into this type, while at the drier extreme, *Artemisia tridentata* ssp. *vaseyana* may occasionally occur. *Festuca idahoensis* is common in the undergrowth, which may also include *Helenium hoopesii, Fragaria virginiana, Potentilla gracilis, Geum triflorum, Achillea millefolium,* and *Taraxacum officinale*. Other graminoids that may be present include *Juncus balticus, Muhlenbergia richardsonis,* and *Carex douglasii* (Youngblood et al. 1985, Moseley 1998).

ADJACENT COMMUNITIES

Adjacent wetter sites support associations dominated *by Salix wolfii, S. boothii,* and *Pentaphylloides floribunda* with a *Deschampsia cespitosa* or *Carex* spp. understory. *Artemisia tridentata* or *Artemisia arbuscula* generally occupy drier, upland sites (Hansen et al. 1995, Moseley 1998).

SPECIES	CON	COVER	M/N	MAX
SHRUBS				
Artemisia cana	100	47.5	45	50
FORBS				
Trifolium longipes	50	10	0	20
Perideridia montana	100	1.5	1	2
Penstemon attenuatus	50	1	0	2
Navarretia intertexta	100	1	1	1
Madia gracilis	100	1.5	1	2
Lupinus aridus	50	1	0	2
Erigeron pumilus	50	3	0	6
Epilobium brachycarpum	100	2	1	3
Aster ascendens	100	3	3	3
Achillea millefolium	100	2.5	1	4
GRAMINOIDS				
Danthonia californica	100	1	1	1
Festuca idahoensis	100	45	30	60
Hordeum brachyantherum	100	1	1	1
Juncus balticus	100	6.5	1	12
Muhlenbergia richardsonis	100	2.5	1	4
Agropyron smithii	50	4	0	8
Carex douglasii	50	20	0	40
Koeleria nitida	50	1.5	0	3
Poa nevadensis	50	1	0	2
Poa pratensis	50	2.5	0	5

MANAGEMENT CONSIDERATIONS

The accessibility of stands of this type may result in overgrazing by livestock. *Festuca idahoensis* is moderately tolerant of grazing but can be injured by intense early spring grazing. Mature plants are strongly competitive while seedlings are weakly competitive. *Artemisia cana* is a vigorous root sprouter following a burn; fire is not an effective method of decreasing shrub densities. Youngblood et al. (1985) state that herbicides have been effective in killing *A. cana* if applied when the plant is phenologically active. Use of mechanical equipment or trampling by livestock when soils are moist can cause soil compaction and increase bare ground (Hansen et al. 1995). *Artemisia cana* is used in seed mixtures for big game range restoration, highway stabilization and beautification, and in mine reclamation work.

SUCCESSIONAL DYNAMICS

This association represents stable conditions. With disturbance, *Festuca idahoensis* may be replaced by the graminoids *Poa pratensis, P. bulbosa,* or *Bromus tectorum,* and forbs such as *Taraxacum officinale* and *Fragaria virginiana* may increase (Youngblood et al. 1985, Hansen et al. 1995).

WILDLIFE FUNCTIONS

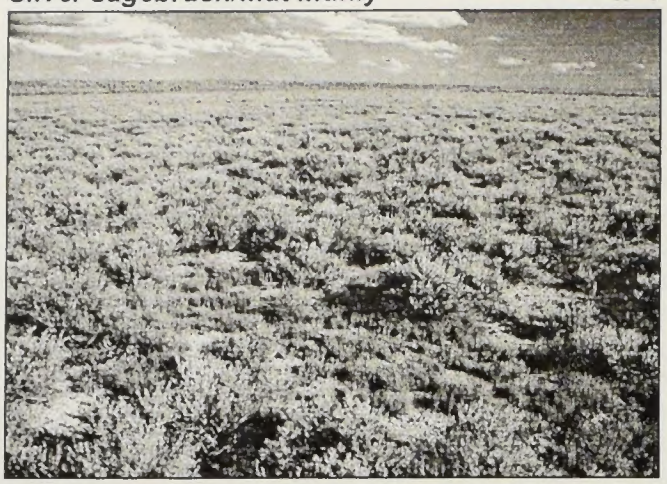
Because of its productivity and proximity to wetter associations, this type is an important source of forage and cover for mammals, songbirds, and game birds. Deer, elk, and antelope may browse this association, especially in winter when snow covers low growing vegetation. Sage grouse use this type for food and nesting cover (Hansen et al. 1995).

CLASSIFICATION COMMENTS

This is a well-defined association. The *Artemisia cana/Festuca idahoensis* association described for Montana by Mueggler and Stewart (1980) is probably this subspecies, ssp. *viscidula* (Hansen et al. 1995). *Artemisia cana* ssp. *cana*, found mostly on the Great Plains, appears to have other understory unions. However, Cronquist (1994) offers an alternative taxonomic view of *Artemisia cana* by merging all infraspecific taxa, stating that there is no basis for splitting them. Manning and Padgett (1995) describe a broad type that they called *Artemisia cana*/Dry graminoid that, in part, included a few stands from the Jarbidge Mountains area that fall into the *Artemisia cana/Festuca idahoensis* type. An *Artemisia cana/Festuca ovina* association described from Utah is similar in structure to this association but is restricted to elevations above 9,200 feet (Padgett et al. 1989).

Artemisia cana/Muhlenbergia richardsonis

Silver sagebrush/mat muhly **n=8**



RANGE

This type has been documented from two disjunct areas of Idaho and Oregon and may also occur in California (Bourgeron and Engelking 1994). In Idaho, it occurs on the central Snake River Plains northeast of Bliss (Hironaka et al. 1983) and in the Owyhee uplands in the southwestern corner of the state (Moseley 1998). In Oregon, it is known from the south-central portion of the state, near the east base of the Cascades (Dealy 1971, Franklin and Dyrness 1988).

ENVIRONMENT

The *Artemisia cana/Muhlenbergia richardsonis* plant association occurs in flat, internally-drained basins which sometimes contain a vernal pool or lake in the center. All the known occurrences are on rolling volcanic plains. In Idaho it lies within the sagebrush-steppe zone and in Oregon it's within the lower montane forest zone. The stands are flooded in the spring of most years, but the surface soils are thoroughly dry by mid-summer. Elevations range from 3,500 feet on the Snake River Plain near Bliss, to 4,300 feet in Oregon, and 5,100 feet in the Owyhee Uplands of Idaho.

SOILS

This type occurs in internally drained basins that accumulate fine-textured alluvium, generally either clay-loam or silt-loam. Soils can be relatively deep, greater than 50 cm, as in the stands sampled in Idaho (Moseley 1998).

VEGETATION COMPOSITION

Artemisia cana is the only shrub that commonly occurs in this type. Most Idaho stands have between 40 and 60% cover of *A. cana*. In Oregon, several trees and shrubs occur at the edge of the type or as inclusions, including *Salix* spp., *Populus tremuloides, Pinus contorta, Artemisia arbuscula,* and *A. tridentata* (Dealy 1971). In Idaho, *Chrysothamnus nauseosus* occurred in trace amounts in one stand. The herbaceous cover is variable and generally sparse. *Muhlenbergia richardsonis* appears to be the most constant species. *Muhlenbergia* cover in Owyhee County stands ranged from 0 to 30% cover. Hironaka et al. (1983) describe *Juncus balticus* as a sparse associate of *Muhlenbergia* in the stands near Bliss and Dealy (1971) states that "*M. richardsonis, Juncus* sp., and *Eleocharis* sp. form a fairly heavy stand" under the *Artemisia cana*. *Poa nevadensis* is mentioned as a dominant in this association "in some areas in Oregon" (Hironaka et al. 1983). Graminoids associated with *Muhlenbergia* in Owyhee County stands include *Poa nevadensis, Eleocharis palustris, Sitanion hystrix*, and *Alopecurus* sp. *Eleocharis palustris* can have cover as high as 90% in Owyhee County stands, with *Muhlenbergia* being absent or having low cover. Forbs are sparse and, in Idaho, consist largely of small annual species, such as *Epilobium pygmaeum, Plagiobothyrs scouleri, Naverritia intertexta,* and *Psilocarphus brevissimus.* A few short-lived perennial species also occur in these stands, such as *Camissonia tanacetifolia*. The ground cover is generally greater than 80% bare soil.

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Artemisia cana	100	32.9	3	50
FORBS				
Epilobium pygmaeum	38	0.4	0	1
Navarretia intertexta	50	1.0	0	3
Plagiobothrys scouleri	38	0.4	0	1
GRAMINOIDS				
Muhlenbergia richardsonis	88	6.4	0	30
Eleocharis palustris	75	22.9	0	90
Poa nevadensis	50	1.0	0	3
Alopecurus sp	38	2.8	0	20

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by *Artemisia tridentata* ssp. *wyomingensis* in Idaho and *Pinus contorta, P. ponderosa,* and *Populus tremuloides* associations in Oregon. The *Eleocharis palustris* association type was the only other wetland type observed to be adjacent to the *A. cana/M. richardsonii* type in southwestern Idaho.

MANAGEMENT CONSIDERATIONS

Little information is available. Dealy (1971) states that there is extreme competition between livestock and deer for the few forbs that do occur in the stands.

SUCCESSIONAL DYNAMICS

Nothing is known about the primary or secondary successional dynamics of this association. Dealy (1971) suggests that when there is a pool or lake at the center of the basin, this association can expand or recede as the water line moves back and forth in response to long-term climatic changes.

WILDLIFE FUNCTIONS

For information on use by wildlife, see the *Artemisia cana/Festuca idahoensis* description.

CLASSIFICATION COMMENTS

This type was originally defined by two brief, general descriptions (Dealy 1971, Hironaka et al. 1983). There was no quantitative analysis or composition and structure data. Moseley (1999) sampled seven stands of *Artemisia cana* in dry lake beds and internally drained basins, which are this association.

Artemisia papposa

Owyhee sagebrush n=4

RANGE

This type has been documented from two disjunct locations in Idaho, although it has only been sampled in one of these. One area is in the Bennett Hills of the upper Little Wood River region at the northern edge of the Snake River Plain in Blaine, Camas, Gooding, Lincoln, and Elmore counties. The other area is on the Owyhee Uplands of southern Owyhee County, south of the Snake River Plain. The species also occurs in adjacent portions of Elko County, Nevada, and Malheur County, Oregon (Cronquist 1994), but the plant association is yet to be documented from these states.

ENVIRONMENT

The *Artemisia papposa* association occurs on gently rolling volcanic plains and low hills. It most often occurs in low-gradient, intermittent drainageways that carry water in the spring, or possibly during intense thunderstorms, but are otherwise dry during the summer. It can also occur in patterned ground or "biscuit and swale" topography that creates poorly drained areas with thin soil over bedrock (swales) between deep-soil mounds (biscuits). The *A. papposa* association occurs in the swales where there is little soil and water subsequently perches on the bedrock during the spring (Eidemiller 1977a, 1977b, Moseley 1987). Associations are best developed on low terraces adjacent to the main intermittent channels. The floodplain of these drainage systems is from 2 to over 10 m wide. Elevations range from about 4,800 to 5,600 feet.

SOILS

Soils are clay and stony-clay derived from volcanic parent material, generally basalt (Eidemiller 1977a). Some authors claim that *A. papposa* is tolerant of alkaline conditions (Eidemiller 1977a, Cronquist 1994).

VEGETATION COMPOSITION

This association is characterized by a moderately dense cover of *Artemisia papposa* with an understory dominated by grasses. *Artemisia papposa* cover ranges from 10% to 40%. *Artemisia cana* and *A. arbuscula* are the only other shrubs present and have low cover. *Poa secunda* is the predominant grass in sampled stands, although *Poa nevadensis, Sitanion hystrix, Danthonia californica,* and *Festuca idahoensis* are present with low cover. Several perennial and annual forbs were present, usually in only trace amounts, though one stand had a combined cover of 20%. *Allium acuminatum, Lomatium cous, Balsamorhiza hookeri,* and *Epilobium brachycarpum* are the most constant forbs. This association occurs in small, but well-developed, patches scattered along drainageways and in patterned ground. Considerable soil is exposed in the association, mostly from natural frost churning and stream erosion, processes that sometimes leave the bunchgrasses, such as *Poa secunda,* on pedestals.

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Artemisia papposa	100	25.0	10	40
FORBS				
Allium acuminatum	75	0.8	0	1
Balsamorhiza hookeri	50	0.5	0	1
Epilobium brachycarpum	75	1.3	0	3
Eriogonum caespitosum	50	0.5	0	1
Haplopappus stenophyllus	50	4.0	0	15
Lomatium cous	50	0.5	0	1
Lomatium leptocarpum	50	2.8	0	10
Phlox longifolia	50	0.8	0	2
Trifolium macrocephalum	50	0.5	0	1
GRAMINOIDS				
Festuca idahoensis	50	1.0	0	3
Poa nevadensis	25	2.5	0	10
Poa secunda	100	22.0	3	30
Sitanion hystrix var hordeoides	100	4.3	1	10

ADJACENT COMMUNITIES

Adjacent upland associations include those dominated by *Artemisia tridentata* ssp. *wyomingensis, A. longiloba, and A. arbuscula.* Adjacent riparian associations in these intermittent

drainage systems include *Danthonia californica* and *Artemisia cana* types.

MANAGEMENT CONSIDERATIONS

Little is known about its response to management. Feral horses browse *Artemisia papposa* in the spring and both deer and sheep readily consume the flower stalks in summer (Tirmenstein 1987).

SUCCESSIONAL DYNAMICS

Little information on the successional status of *Artemisia papposa* associations is available. The associations appear to be climax communities on very shallow, stony basalt (USDA 2000).

WILDLIFE FUNCTIONS

Artemisia papposa presumably provides very limited cover for larger mammals due to it short stature (ca. 30 cm tall). It may, however, provide escape cover for smaller birds and mammals. Because it is deciduous, *A. papposa* provides little thermal cover during the winter (Tirmenstein 1987).

CLASSIFICATION COMMENTS

This association has been mentioned in several studies during the last two decades (Eidemiller 1977a, 1977b, Moseley 1987, Tirmenstein 1987). However, species composition and structure have only recently been sampled (Moseley 1998 and unpublished data).

Artemisia tridentata ssp. tridentata/ Elymus cinereus

Basin big sagebrush/basin wildrye **n=6**

RANGE

This plant association has been reported from Colorado, Wyoming, Nevada, Idaho, Oregon, and possibly Wyoming (Hironaka et al. 1983, Weixelman et al. 1996, Reid et al. 2000).

ENVIRONMENT

This association is often in the transition zone between drier upland associations and the wetter riparian zone. *Artemisia tridentata* ssp. *tridentata* is an indicator of deep soil. It is most often found in areas of deep alluvial deposition on the valley bottom, usually on stream terraces, but has also been observed on toeslopes. Seasonal flooding on these sites is rare. Occurrences are generally below 6,000 feet in the north (Idaho) and 8,000 feet in the south (Nevada).

SOILS

The soil is silty loam to sandy loam and can be very deep. Where coarse fragments occur in the soil profile, they are generally less than 60% by volume in any given horizon. In some stands, surface soils are moist into late summer and depth to field capacity moisture is within a meter of the surface. On deep alluvial terraces along larger rivers, this depth may be as much as 3 m and the surface soils are dry by late summer. Soils at higher elevation sites in Nevada have been classified as Cryoborolls, while at lower elevations in Idaho they are Haploxerolls (Weixelman et al. 1996, Fisher and Moseley 1997).

VEGETATION COMPOSITION

Artemisia tridentata ssp. *tridentata* dominates the shrub layer and a mixture of graminoids and forbs dominate the herbaceous layer in stands of high ecological condition, however, *Elymus cinereus* usually is the most abundant species, sometimes reaching near 100% cover. Basin big sagebrush generally has canopy cover over 50%. It has a stout taproot that grows to a depth of 1 to 4 m and is able to tap moisture deep in the soil profile. Therefore, basin big sagebrush is considered a phreatophyte. Cover of *Chrysothamnus* spp. is low in high quality stands. Total graminoid cover can be as high as 70%, with *Elymus cinereus* comprising most of this. Total forb cover is generally less than 20% (Weixelman et al. 1996).

SPECIES	CON.	COVER	MIN	MAX
SHRUBS				
Artemisia tridentata ssp. tridentata	100	33.3	10	60
Chrysothamnus nauseosus	50	2.3	0	10
Chrysothamnus viscidiflorus	50	2.0	0	10
Sarcobatus vermiculatus	50	11.7	0	30
FORBS				
Lepidium perfoliatum	67	1.0	0	3
Descurainia sophia	50	0.5	0	1
Chenopodium album	50	0.5	0	1
Achillea millefolium	50	0.5	0	1
GRAMINOIDS				
Agropyron smithii	50	0.5	0	1
Apera interrupta	33	0.3	0	1
Bromus tectorum	83	18.3	0	30
Elymus cinereus	83	51.7	0	90
Poa nevadensis	33	1.0	0	3
Poa secunda	50	0.8	0	3

ADJACENT COMMUNITIES

This association largely occurs in the sagebrush-steppe zone, with adjacent upland associations being dominated by various *Artemisia tridentata* associations. Numerous riparian associations occur in the adjacent floodplain.

MANAGEMENT CONSIDERATIONS

The diagnostic shrub and graminoid are only moderately palatable. During much of the year *Elymus cinereus* is coarse and unpalatable. It can, however, be damaged if young spring and fall growth is grazed. Spring and winter rest periods are needed to replenish the root reserves of *Elymus cinereus*. *Elymus cinereus* is generally resistant to fire, but can be eliminated in hot fires when soils are very dry. *Artemisia tridentata* will decrease with fire.

Prescribed burns should be used only when soil moisture is high and at sites that have remnants of palatable grasses. Livestock should be excluded from burned sites to allow root reserves to build up and to prevent premature utilization of new shoots. Both *Elymus cinereus* and *Artemisia tridentata* ssp. *tridentata* can be used for range restoration and soil stabilization (Kittel et al. 1999).

SUCCESSIONAL DYNAMICS

Indicators of disturbance in this association, such as heavy livestock grazing or fire, include high coverage of species such as *Chrysothamnus* spp., *Iva axillaris, Iris missouriensis,* and *Bromus tectorum* (Weixelman et al. 1996). At low elevations in southwestern Idaho, *Sarcobatus vermiculatus* can occur in stands with canopy cover equal to the *Artemisia*. It is unknown if this reflects a successional stage due to livestock grazing.

WILDLIFE FUNCTIONS

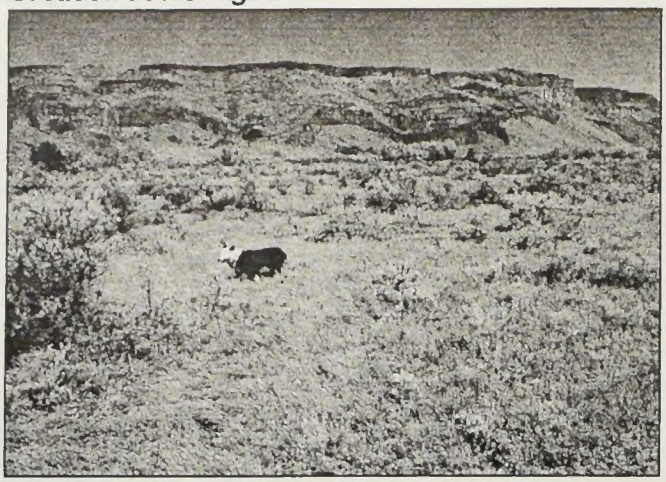
Artemisia tridentata is not preferred browse but is a very important emergency food during winter months. Sage grouse, mule deer, elk, and pronghorn antelope will forage on plants. Pygmy rabbits forage extensively on big sagebrush. This plant association does provide cover for upland game birds and small mammals (USDA 2000).

CLASSIFICATION COMMENTS

Artemisia tridentata ssp. *tridentata/Elymus cinereus* is included in Hironaka et al. (1983) as a habitat type known to be present in Idaho and adjacent states that was not described in their classification. This association has recently been described in Nevada (Weixelman et al. 1996) and Idaho (Moseley 1998). A considerable amount of literature refers to plant associations with *Artemisia tridentata* as the dominant shrub. However, identificaion to the subspecies has not always occurred. The Western Regional Vegetation Classification (Reid et al. 2000) recognizes a broadly defined *Artemisia tridentata/Elymus cinereus* association that is used when subspecies is unknown. When subspecies is known the *Artemisia tridentata* ssp. *tridentata/Elymus cinereus* and *Artemisia tridentata* ssp. *vaseyana/Elymus cinereus* plant associations should be recognized.

Sarcobatus vermiculatus/Distichlis spicata

Greasewood/saltgrass **n=2**



RANGE

This association occurs in Colorado, Idaho, Montana, Washington, and Oregon (Bourgeron and Engelking 1994), and possibly also Wyoming, Nevada, and Utah (Daubenmire 1970).

ENVIRONMENT

The *Sarcobatus vermiculatus/Distichlis spicata* association occurs in broad, level to gently sloping bottomlands and terraces, either along low-gradient creeks and rivers or as internally drained basins. These depositional areas have deep alluvial soils. The water table is within a few cm of the soil surface throughout the growing season. Elevations are generally less than 5,000 feet and the climate is arid. Salts accumulate in the soils as inflowing surface waters evaporate.

SOILS

The type occurs on poorly-drained, fine-textured alluvium. Soils have a high pH. Daubenmire (1970) found that *Sarcobatus vermiculatus* raises the soil pH directly beneath the canopy.

VEGETATION COMPOSITION

This plant association is characterized by a sward of *Distichlis spicata* over which are scattered bushes of *Sarcobatus vermiculatus* growing 1 to 2 m tall. Species richness is very low. *Suaeda occidentalis* and *Atriplex* spp. commonly occur in southwest Idaho stands.

ADJACENT COMMUNITIES

The low elevations occupied by this association limit adjacent upland vegetation to either salt-desert shrub (e.g., *Atriplex confertifolia* and *Grayia spinosa*) or *Artemisia tridentata*-steppe vegetation. Adjacent wetland vegetation may include stands of *Distichlis spicata, Juncus balticus, Eleocharis palustris, Elymus triticoides, Agropyron smithii,* and *Sporobolus airoides.*

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Artemisia tridentata ssp. tridentata	50	0.5	0	1
Sarcobatus vermiculatus	100	30	20	40
FORBS				
Descurainia sophia	50	0.5	0	1
Lepidium perfoliatum	50	5	0	10
GRAMINOIDS				
Bromus tectorum	100	1	1	1
Distichlis spicata	50	45	0	90
Hordeum jubatum	50	0.5	0	1
Poa secunda	50	10	0	20

MANAGEMENT CONSIDERATIONS

Ordinarily, *Sarcobatus vermiculatus* is little used by livestock, but under heavy grazing pressure the shrubs become smaller and develop a compact canopy. In disturbed stands *Bromus tectorum* will replace *Distichlis*. In a *Sarcobatus* stand where *Distichlis* had been replaced by *Bromus tectorum* because of past heavy grazing, winter rains moistened the soil profile no deeper than 6 dm. However, the negligible transpiration of the leafless shrub in winter allowed so much water to be stored in the soil that the following spring *Bromus* was distinctly more productive here than in a nearby area where the only shrub was the evergreen, *Artemisia tridentata* (Daubenmire 1970).

SUCCESSIONAL DYNAMICS

Fire kills *Sarcobatus vermiculatus* back only to the ground surface, and sprouts from the root crown appear promptly afterward (Daubenmire 1970). *Distichlis spicata* appears to recover to near pre-fire cover within five years. Heavy grazing leads to the dominance by annuals such as *Bromus tectorum, Lepidium perfoliatum,* and *Bassia hyssopifolia*, but *Distichlis* itself is highly tolerant of grazing. Only severe use will bring about its displacement.

WILDLIFE FUNCTIONS

Sarcobatus vermiculatus may be utilized by cattle, deer, and antelope in the winter, but it is poisonous to sheep (Mueggler and Stewart 1980). This association may provide some habitat as well as

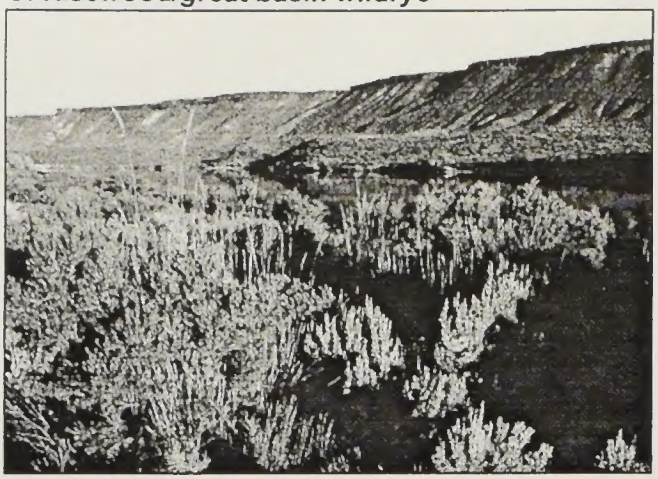
thermal and hiding cover for big game and upland birds (Hansen et al. 1995).

CLASSIFICATION COMMENTS

The *Sarcobatus vermiculatus/Distichlis spicata* plant association has been reported in several classifications (Daubenmire 1970, Mueggler and Stewart 1980, and Kittel et al. 1999) and documented with recent field data.

Sarcobatus vermiculatus/Elymus cinereus

Greasewood/great basin wildrye



RANGE

This association is a minor type at lower elevations in Montana, Idaho, Oregon, and Washington, and possibly Nevada and California.

ENVIRONMENT

The *Sarcobatus vermiculatus/Elymus cinereus* association occurs as narrow bands along low-gradient creeks and rivers, in internally drained basins, and occasionally in association with seeps at the base of talus slopes. These depositional areas often have deep alluvial soils. The water table is generally within a few centimeters of the soil surface throughout the growing season. Elevations are generally less than 6,500 and the climate is arid. Salts often accumulate in the soils as inflowing surface waters evaporate.

SOILS

The type occurs on poorly drained, saline or alkaline clay soils.

VEGETATION COMPOSITION

The *Sarcobatus vermiculatus/Elymus cinereus* association is comprised of approximately equal cover of *Sarcobatus vermiculatus* and *Elymus cinereus*. The shrub *Chrysothamnus nauseosus* (and/or *C. viscidiflorus*) is frequently present with high cover indicative of disturbance. Forbs and grasses are sparse and bare ground is usually present. *Crepis runcinata, Haplopappus uniflorus, Phlox kelseyi* var. *kelseyi, Sisyrinchium idahoense, Agropyron smithii, Juncus balticus,* and *Poa juncifolia* are often present.

ADJACENT COMMUNITIES

The low elevations occupied by this association limit adjacent upland vegetation to either salt-desert shrub (e.g. *Atriplex confertifolia* and *Grayia spinosa*) or *Artemisia tridentata*-steppe vegetation. Adjacent wetlands may be dominated by graminoids (e.g. *Carex aquatilis, Juncus balticus, Deschampsia cespitosa*) or shrubs (*Pentaphylloides floribunda*).

MANAGEMENT CONSIDERATIONS

Both of the diagnostic species are palatable early in the growing season. Spring grazing of *Elymus cinereus* is very harmful to this grass species and at least 10 to 12 inches of stubble should be left. *Sarcobatus vermiculatus* is moderately poisonous to cattle and sheep, but will be browsed in the spring (Ogle 1997). Heavy spring and summer grazing will result in a decrease in *Sarcobatus* (Hansen et al. 1998). *Bromus tectorum* can replace *Elymus cinereus* in overgrazed stands.

SUCCESSIONAL DYNAMICS

Fire kills *Sarcobatus vermiculatus* back only to the ground surface, and it resprouts from the root crown promptly afterward (Daubenmire 1970).

WILDLIFE FUNCTIONS

Sarcobatus vermiculatus may be utilized by cattle, deer, and antelope in the winter, but it is poisonous to sheep (Mueggler and Stewart 1980). This association may provide some habitat as well as thermal and hiding cover for big game and upland birds (Hansen et al. 1995).

CLASSIFICATION COMMENTS

This association has been well described in the western United States and documented with recent field data.

Miscellaneous Low Shrub Plant Associations

Artemisia arbuscula (longiloba) ephemeral drainage

Low sagebrush ephemeral drainage

(14 community observations)

Ephemerally moist drainages dominated by either *Artemisia arbuscula* or *Artemisia longiloba* are sometimes observed on the volcanic tablelands, shield volcanoes, and flat plateaus of the Owyhee Plateau uplands (Rust et al. 2000). Four different low sagebrush plant associations (*Artemisia arbuscula/Festuca idahoensis, Artemisia longiloba/Festuca idahoensis, Artemisia arbuscula/Poa secunda, and Artemisia longiloba/Poa secunda*) were observed (see table below). They were all observed in drainageways with shallow, silt loam soils (usually rocky and gravelly) underlain by clay. These shallow, and often broad, drainages may or may not carry water annually (depending on the amount and timing of snowmelt or rainstorm runoff), but are always moist or saturated in early spring (Rust et al. 2000). Elevations of these low sagebrush drainages are typically between 5,000 and 6,000 feet on the Owyhee Plateau. *Artemisia arbuscula* and *Artemisia longiloba* dominated plant associations have been described by numerous other researchers (e.g., Hironaka et al. (1983) in Idaho; Nelson and Jensen (1987) in northern Nevada; and Johnson and Clausnitzer (1992) in eastern Oregon), but these studies did not specifically focus on ephemeral drainages. Moreover, the *Artemisia longiloba/Poa secunda* plant association has not been formerly described. Due to the lack of plot data collected from low sagebrush ephemeral drainage associations, the four types observed on the Owyhee Plateau will be summarized as one grouping.

Low sagebrush associations dominated by *Festuca idahoensis* appear much different than low sagebrush associations dominated by *Poa secunda*. Structural similarities exist between *Artemisia arbuscula/Festuca idahoensis* and *Artemisia longiloba/Festuca idahoensis* plant associations, especially the proportion of shrub to bunchgrass cover (just as *Poa secunda* types are structurally similar to each other). Soil depth is generally the deciding factor in whether a site will or will not support *Festuca idahoensis* (Hironaka et al. 1983, Johnson and Clausnitzer 1991). For example, the *Artemisia arbuscula/Poa secunda* plant association is restricted to scabland soils (lithosols) less than 25 cm in depth while *Festuca idahoensis* types are not restricted. In ephemeral drainages, where overland water runoff occasionally occurs, natural soil erosion is common and soils are generally very thin, rocky, and clay rich. As a result, low sagebrush associations dominated by *Poa secunda* are more common than associations with *Festuca idahoensis* (Rust et al. 2000). Within a drainage, intermixing of low sagebrush communities can occur, such as when *Festuca idahoensis* (or even *Agropyron spicatum*) is restricted to low mounds of silt loam soil and *Poa secunda* is found on the eroded, shallow soil of clay rich swales ("biscuit and swale" topography) (Rust et al. 2000). The soils supporting *Artemisia arbuscula*, however, can sometimes differ from those supporting *Artemisia longiloba*. For example, *Artemisia longiloba* is restricted to soils underlain by strongly developed claypans while *Artemisia arbuscula* is not restricted to such sites (Hironaka et al. 1983, Nelson and Jensen 1987). The water-holding capacity of clay rich soils is high and drainages with strong claypans are more likely to have small vernal pool-like areas. Thus, *Artemisia longiloba* associations are more likely to have species indicative of vernally moist soils, such as *Artemisia cana, Carex douglasii, Juncus balticus, Navarretia intertexta, Plagiobothrys scouleri, Polygonum* spp., and *Veronica peregrina* (Rust et al. 2000). Occasionally, soil depths are too shallow, conditions are too wet, or sites are otherwise unsuitable for the growth of low sagebrush. On the Owyhee Plateau, these ephemeral drainages may be dominated by *Artemisia cana, Artemisia papposa, Danthonia californica, Eriogonum* spp. (e.g., *Eriogonum caespitosum*), *Muhlenbergia richardsonis*, *Poa* spp. (e.g., *Poa nevadensis* or *P. secunda*), *Wyethia amplexicaule*, or other related plant associations (Moseley 1999, Rust et al. 2000). Sites with sufficient annual precipitation may support the *Juniperus occidentalis* ephemeral drainage plant association (Moseley 1999).

Artemisia arbuscula/Festuca idahoensis and *Artemisia longiloba/Festuca idahoensis* stands were both obviously dominated by *Festuca idahoensis* (whose cover often exceeded that of the low sagebrush) (see table below). They also share some common species, such as *Poa secunda, Sitanion hystrix, Antennaria dimorpha, Balsamorhiza hookeri, Erigeron pumilus*, and *Microseris nutans* (Rust et al. 2000). They also share some indicators of ephemerally moist drainages, such as *Danthonia californica* and *Haplopappus uniflorus*. The shallow, rocky silt loam soil commonly found in the *Artemisia arbuscula/Festuca idahoensis* plant association is reflected by the presence of species, such as *Artemisia papposa, Lomatium nudicaule, Erigeron*

bloomeri, Arenaria kingii, Haplopappus stenophyllus, and *Sisyrinchium inflatum*. These species are less commonly found on the clay-rich soils of *Artemisia longiloba/Festuca idahoensis* stands. The other two plant associations, *Artemisia arbuscula/Poa secunda* and *Artemisia longiloba/Poa secunda*, occupy ephemeral drainages with even shallower, rockier claypan soil. Such scabland sites are dominated by low sagebrush and *Poa secunda*, in generally equal proportions, with *Sitanion hystrix* also common (see table below) (Rust et al. 2000). *Danthonia californica* is occasionally seen in *Artemisia arbuscula* dominated drainages. Other shallow soil indicators, such as *Arenaria congesta, Balsamorhiza hookeri, Erigeron caespitosum, Lomatium cous, Phoenicaulis cheiranthoides*, and *Trifolium macrocephalum*, are also common. By contrast, *Artemisia longiloba/Poa secunda* stands are less diverse. Their soil is essentially unproductive and clay rich at the surface. Phlox hoodii is the only consistently common forb.

Summary of number of observations (# Obs.), survey sites, and abundant, common, or indicator species for ephemeral drainage plant associations.

Plant Association	# Obs	Reference site	Other survey sites	Important species
Artemisia arbuscula/ Festuca idahoensis	2	Big Springs Butte Basin	71 Draw	*Artemisia arbuscula* (up to 20%), *Artemisia papposa; Festuca idahoensis* (15-25%), *Poa secunda* (up to 30%), *Sitanion hystrix, Danthonia californica; Lomatium spp., Erigeron spp., Arenaria kingii, Antennaria luzuloides, Balsamorhiza hookeri, Haplopappus stenophyllus, Microseris nutans, Sisyrinchium inflatum, Wyethia amplexicaule*
Artemisia arbuscula/ Poa secunda	7	45 Ranch	Columbet Table Dickshooter Ridge Piute Basin 71 Draw	*Artemisia arbuscula* (up to 30%); *Poa secunda* (~30%), *Sitanion hystrix, Danthonia californica; Eriogonum caespitosum, Lomatium* spp., *Erigeron spp., Balsamorhiza hookeri, Arenaria spp., Antennaria* spp., *Phoenicaulis cheiranthoides, Trifolium macrocephalum*
Artemisia longiloba/ Festuca idahoensis	2	None	Dry Creek (a tributary to Battle Creek) Harris Creek	*Artemisia longiloba* (25-40%), *Artemisia cana, Purshia tridentata; Festuca idahoensis* (up to 40%), *Poa* spp. (~25%), *Sitanion hystrix, Koeleria cristata, Stipa* spp., *Juncus balticus; Eriogonum caespitosum, Phlox* spp., *Erigeron pumilus, Polygonum* spp., *Aster scopulorum, Eriogonum umbellatum, Balsamorhiza hookeri, Antennaria* spp., *Microseris* spp.
Artemisia longiloba/ Poa secunda	3	Owyhee Tableland Vernal Lakes	Duck Valley	*Artemisia longiloba* (20-30%); *Chrysothamnus* spp., *Artemisia cana; Poa secunda* (15-25%), *Sitanion hystrix; Phlox hoodii, Astragalus* spp., *Allium acuminatum, Navarretia intertexta*

Artemisia cana/Mesic graminoid

Silver sagebrush/Mesic graminoid

(5 community observations)

The heterogeneous and *variable Artemisia cana*/mesic graminoid plant association was observed at four locations scattered across the volcanic Owyhee Plateau in southwest Idaho (Rust et al. 2000). Stands of this tentative type were observed at one reference site (Turner Table) and at other tableland/plateaus and, less commonly, in broad basin valley sites generally between 5,000 and 6,000 feet in elevation. Sites are vernally saturated (usually, but not always, internally drained) with thick clay and silt rich soils that crack upon drying. While similar in many ways to the *Artemisia cana*/mesic graminoid plant association described from riparian meadows in Nevada by Manning and Padgett (1995), these stands appear more closely aligned with the *Artemisia cana/Muhlenbergia richardsonis* association found in vernal basins of eastern Oregon and southwest Idaho (Moseley 1999). For example, vernal pools, lakes, or reservoirs dominated by *Eleocharis palustris* are often ringed by a band of *Artemisia cana* with variable amounts of *Muhlenbergia richardsonis, Eleocharis palustris*, and/or other mesic graminoid species in the understory. Many of these stands have been classified as *Artemisia cana/Muhlenbergia richardsonis*, though further plot samples may lead to the delineation of an *Artemisia cana/Eleocharis palustris* association (Moseley 1999, Rust et al. 2000). Remaining stands, with only trace amounts of *Muhlenbergia richardsonis*, are lumped into this *Artemisia cana*/mesic graminoid plant association. However, there is often a heterogeneous mix of understory herbaceous species reflecting excessive soil disturbance from livestock grazing and environmental change along moisture gradients (Rust et al. 2000). For these reasons, numerous stands observed on the Owyhee Plateau fall somewhere in between the *Artemisia cana*/mesic graminoid and the *Artemisia cana*/dry graminoid (or *Artemisia cana/Festuca idahoensis*) plant associations, making their classification difficult (Moseley 1999, Rust et al. 2000).

The *Artemisia cana*/mesic graminoid plant association observed on the Owyhee Plateau is characterized by 25 to 40% cover of 0.2 to 0.5 m tall *Artemisia cana* with trace amounts of *Artemisia* spp. *(Artemisia arbuscula, A. longiloba*, and/or *A. papposa*) usually present (Rust et al. 2000). The most common and abundant mesic graminoid species, each with variable cover, are *Danthonia californica, Deschampsia danthonioides*, annual *Eleocharis* spp., *Eleocharis palustris, Hordeum brachyantherum, Juncus balticus, Juncus ensifolius*, and *Muhlenbergia richardsonis*. Dry graminoid species, especially *Poa nevadensis*, but also including *Agropyron smithii, Carex douglasii, Festuca idahoensis,* and *Sitanion hystrix*, are often present but with low cover. Weedy species indicative of livestock disturbance, such *as Bromus tectorum, Poa pratensis, and Ranunculus testiculatus, Rumex crispus*, and *Taraxacum officinale* are sometimes present. The most common forb species, generally with low cover, are annuals typical of vernally moist areas and include *Epilobium pygmaeum, Madia* spp., *Navarretia intertexta, Plagiobothrys scouleri*, annual *Polygonum* spp., *Psilocarphus brevissimus*, and *Veronica peregrina* (Rust et al. 2000). Perennial mesic forbs, with low cover, are also sometimes observed, such as *Arnica sororia, Camassia quamash, Camissonia tanacetifolia, Eryngium alismifolium, Haplopappus uniflorus*, and *Iva axillaris*.

Unclassified Artemisia tridentata ssp. tridentata associations

Basin big sagebrush Unclassified Plant Associations

(2 plots)

Two stands dominated *by Artemisia tridentata* ssp. *tridentata* were observed on alluvial terraces and bottomlands in Duck Valley of southwest Idaho (Rust et al. 2000). Though *Artemisia tridentata* ssp. *tridentata/Elymus cinereus* plant associations are widespread throughout the west and southwest Idaho (Moseley 1998, Reid et al. 2000), neither of these stands seemed classifiable as *Artemisia tridentata ssp. tridentata/Elymus cinereus*. Both stands, however, have had long histories of livestock grazing and burning which may have eliminated nearly all *Elymus cinereus*, reduced *Artemisia tridentata* cover, and created early to mid-seral communities. One stand, on sandy silt loam soils of alluvial terraces along Shoofly Creek, appeared most similar to *Artemsia tridentata ssp. tridentata/Carex douglasii* or A. *tridentata* ssp. *tridentata/Poa secunda* known from Nevada (Weixelman et al. 1996). It had a mixed shrub overstory of *Artemisia tridentata* ssp. *tridentata* and *Chrysothamnus nauseosus* (totaling about 20% cover between them) with lesser

amounts of *Artemisia cana*, *A. longiloba*, *A. tridentata* (both ssp. *vaseyana* and *wyomingensis*), and *Chrysothamnus viscidiflorus* intermixed (Rust et al. 2000). *Poa secunda* dominated the herbaceous understory with about 25% cover, though *Carex douglasii* had up to 10% cover and annual *Bromus* spp. were common. *Elymus triticoides* and *Poa nevadensis* each had up to 3% cover but *Elymus cinereus* had only trace cover. Forb cover was generally sparse. Forb species included *Cirsium scariosum*, *Eriogonum umbellatum*, *Erigeron pumilus*, *Iva axillaris*, *Lupinus lepidus*, and *Phlox hoodii*. The other stand observed, on bottomlands near Payne Creek, was much wetter and formed a transition zone between *Juncus balticus* meadow and drier *Artemisia tridentata* ssp. *vaseyana* and/or *wyomingensis/Festuca idahoensis* uplands. Both *Artemisia tridentata* ssp. *tridentata* and *Chrysothamnus* spp. had 5 to 10% cover each (Rust et al. 2000). *Artemisia cana* and *A. tridentata* had trace cover. *Juncus balticus* dominated the understory with about 20% cover, though *Elymus cinereus* and *Agropyron smithii* were sub-dominant. *Bromus tectorum*, *Carex praegracilis*, *Carex douglasii*, *Festuca idahoensis*, *Koeleria nitida*, and *Muhlenbergia richardsonis* were all present with up to 10% cover each. Several forbs were important, including *Artemisia ludoviciana*, *Aster* spp., and *Trifolium* spp., while other forbs (e.g., *Achillea millefolium*, *Haplopappus lanceolatus*, *Potentilla gracilis*, and *Orthocarpus* spp.) had only trace cover. Though *Elymus cinereus* cover was high, this stand was most similar to *the Artemisia tridentata* ssp. *tridentata/Juncus balticus* plant association known from Nevada (Weixelman et al. 1996). Further sampling with plots may improve classification of these stands.

Sarcobatus vermiculatus/Poa secunda association

Greasewood/Sandberg bluegrass
(1 plot and 1 community observation)

The tentative *Sarcobatus vermiculatus/Poa secunda* plant association occurs on high alluvial terraces in valley and canyon bottoms. It was observed in two areas along the South Fork Owyhee River on the 45 Ranch Allotment (Moseley 1999). It was sampled at Bull Camp and observed at Coyote Hole. Both of these areas are on wide terraces in the canyon which have had human habitation in the past. The stand sampled at Bull Camp had 40% cover of *Sarcobatus vermiculatus*, 20% *Poa secunda*, and 10% of the exotic weed *Lepidium perfoliatum*. *Artemisia tridentata* ssp. *tridentata* was present in trace amounts. Surprisingly, *Bromus tectorum* occurred in only trace amounts. The stand at Coyote Hole was similar, except *Poa secunda* was absent and *Lepidium perfoliatum* had higher cover. *Bromus tectorum* again had very low cover (Moseley 1999). Unlike the widespread *Sarcobatus vermiculatus/Distichlis spicata* plant association, salt encrusted soils and *Distichlis spicata* were both absent (Moseley 1998). Soils were probably sandy silt-loam. Superficially, these terraces appear similar to the many other river terraces along the South Fork and Little Owyhee rivers, where the *Artemisia tridentata* spp. *tridentata/Elymus cinereus* plant association dominates (Moseley 1999). Occasionally, these *Artemisia tridentata* ssp. *tridentata* stands are even co-dominated by *Sarcobatus vermiculatus*. Alternatively, this plant association may be related to the *Sarcobatus vermiculatus/Elymus cinereus* association. The *Sarcobatus vermiculatus/Poa secunda* type may be a grazing-induced type (with *Elymus cinereus* removed by cattle), due to its occurrence near two old homesteads. This may be purely coincidence, however, because all other stands of *Artemisia tridentata* spp. *tridentata/Elymus cinereus* that were obviously degraded by livestock still had the *Artemisia*, but the native grasses had been replaced by *Bromus tectorum*. In fact, adjacent to the large *Sarcobatus vermiculatus/Poa secunda* stand at Bull Camp, on a somewhat lower terrace, was a small stand of *Artemisia tridentata* spp. *tridentata/Elymus cinereus* in reasonably good condition. The site supporting this community may represent a different soil type, possibly on a terrace farther from the water table (Moseley 1999). Further sampling is needed to classify these stands.

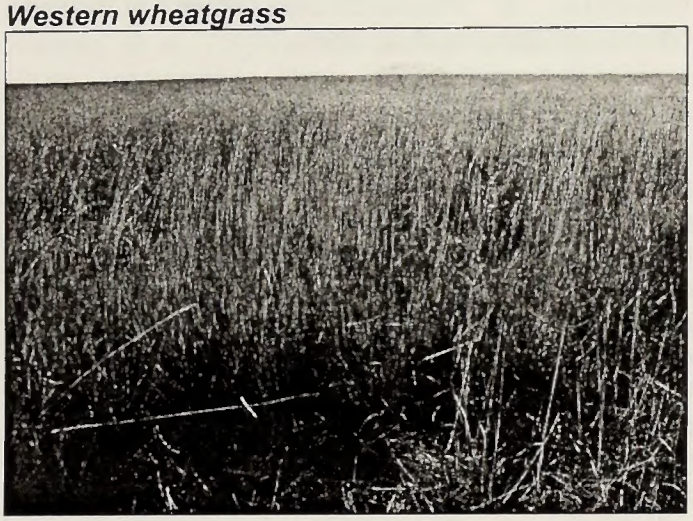
Plant associations expected to occur or noted but not sampled

Riparian terraces and banks dominated by *Toxicodendron rydbergii* are expected to occur at low elevations in southwest Idaho but were not sampled. They have been noted in southern Hells Canyon along the Snake River reservoirs.

GRAMINOID ASSOCIATIONS

Agropyron smithii

Western wheatgrass



RANGE

Agropyron smithii associations have been reported at lower elevations in Montana, Idaho, Colorado, Utah, Nebraska, Saskatchewan, and Wyoming.

ENVIRONMENT

This community occurs on flat to gently sloping topography. Landforms where this association occurs are variable, ranging from floodplains to depressions to alluvial fans where overland flow or groundwater allows for seasonably wet moisture regimes.

SOILS

Soil texture ranges from poorly drained to very poorly drained clay to silt loams. Soils vary widely from neutral to moderately akaline (Hansen et al. 1995). Soils are deep (40-100 cm) and well developed.

VEGETATION COMPOSITION

Agropyron smithii occurs in nearly pure stands (80% cover) with few associates having high constancy or abundance. Species such as *Eleocharis palustris, Koeleria nitida,* and *Poa nevadensis* may be locally abundant. *Artemisia ludoviciana, Stipa viridula,* and *Stipa comata* may also be present throughout the range of the association. In southwest Idaho *Distichlis spicata, Sporobolus airoides,* and *Carex praegracilis* are associated.

ADJACENT COMMUNITIES

Adjacent wetter sites may include *Spartina gracilis, Phragmites australis, Phalaris aurundinacea,* or *Carex* spp. Drier sites are typically occupied by upland species (Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

This type is tolerant of grazing pressure and drought. Overgrazing in May and June may decrease its productivity. Following drought or management of overgrazed areas the dominant species will rapidly colonize areas it previously occupied (Hansen et al. 1995). *Agropyron smithii* is tolerant of fire during the dormant state. During the growing season recovery from fire may be delayed. The dominant graminoid has potential for revegetating disturbed or degraded wetland sites. Transplants are desirable since seedlings may be slow growing. Once the species becomes established, the plants are able to spread quickly by rhizomes (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Overgrazing of this type will reduce the vigor of the dominant graminoid and may eventually result in conversion to a type dominated by the exotics *Poa pratensis* or *Agrostis stolonifera.* When grazing is removed, *Symphoricarpos occidentalis, Glycyrrhiza lepidota,* and *Cirsium arvense* may invade (Hansen et al. 1995).

WILDLIFE FUNCTIONS

Agropyron smithii stands may be used by waterfowl for nesting sites. The diagnostic graminoid is browsed by antelope and deer during the spring when stems are palatable (Hansen et al. 1995).

CLASSIFICATION COMMENTS

The *Agropyron smithii* plant association has been quantitatively described in Montana (Hansen et al. 1995) and documented in Idaho with recent field data and observations.

Carex lanuginosa

Woolly sedge

RANGE

The *Carex lanuginosa* plant association is a minor type in Colorado, Utah, Idaho, Montana, British Columbia, Washington, and Oregon. *Carex lanuginosa* is a common sedge that occurs throughout the northern and western United States. It is likely that this or a closely related association occurs in Wyoming, California, and New Mexico. Small patches of this association are somewhat common on the lower Boise and Payette rivers.

ENVIRONMENT

The association usually occupies former active fluvial surfaces along low to moderate elevation floodplains and headwater basins or meadows. Stands may occur in depressions and swales at the saturated edge of stream channels or in seasonally standing water.

SOILS

Surface textures range from fine sandy to sandy clay loams on floodplains, to organic loam in the basins (Kovalchik 1987). Floodplain soils are often flooded during spring runoff and the water table is well down in the rooting zone (within 1 m of the surface) by mid summer. The basin sites have higher water tables and are moist through most summers (Kovalchik 1987).

VEGETATION COMPOSITION

Carex lanuginosa clearly dominates stands with 30 to 80% cover. Low species diversity, with few associates having high constancy, is characteristic. *Deschampsia cespitosa, Carex microptera, Carex nebrascensis, Juncus balticus* and *Poa pratensis* are occasionally present. In southwest Idaho, *Scirpus* spp., *Juncus effusus,* and *Carex praegracilis* have been recorded in stands. Hansen et al. (1988) reports that *Carex lasiocarpa* may be codominant in some stands in Montana. This has not been observed in Idaho stands.

ADJACENT COMMUNITIES

Wetter associations may include those dominated by *Carex utriculata, Typha latifolia,* and other mesic graminoids. Drier sites may include riparian forests with *Salix amygdaloides* or *Populus* spp. in the overstory or herbaceous wetlands dominated by *Deschampsia cespitosa.* Uplands are typically dominated by *Artemisia tridentata* or *Artemisia cana* at lower elevations and *Pinus contorta, Abies lasiocarpa,* or *Populus tremuloides* at higher elevations (Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

Carex lanuginosa appears able to withstand moderate grazing pressures, though overuse of stands may increase the presence of invasive species such as *Agrostis stolonifera, Poa pratensis,* or *Juncus balticus.* Trampling by livestock as well as heavy machinery use may result in compaction or displacement of soils (Padgett et al. 1989). Vegetation composition and structure can be altered due to impacts such as water development, recreational activities, or agriculture. With management intervention such as grazing schedules, fencing, education, and stream rehabilitation to elevate water tables, moderately disturbed stands recover rapidly due to the rhizomatous habit of the sedge (Kovalchik 1987, Hansen et al. 1988). Prescribed fire is a useful tool on this type. Fire can be used in spring or late summer to help reduce litter accumulation and competitors. Woolly sedge should be very resistant to damage by ground fire (Kovalchik 1987, Hansen et al. 1988). This species is useful for improving degraded riparian sites. Long, creeping rhizomes form a dense mat, effectively stabilizing streambank soils (Hansen et al. 1988). Revegetation with woolly sedge and other species, over time, can stabilize streambanks and improve fish habitat (Kovalchik 1987).

SUCCESSIONAL DYNAMICS

The *Carex lanuginosa* plant association appears to be a fairly stable type because of its strongly rhizomatous nature and occurrence on well developed soils. The type may replace the *Deschampsia cespitosa* association under moderate to heavy grazing pressures (Padgett et al. 1989), or an increase in species such as *Agrostis stolonifera, Poa pratensis,* or *Juncus balticus* may be evident. On drier floodplain landforms, overgrazing changes the site potential towards the Kentucky bluegrass community. Kovalchik (1987) reports that on sites where streambed downcutting has occurred, lowered water tables have changed the site potential to the sagebrush/Cusick bluegrass association.

WILDLIFE FUNCTIONS

Landforms containing woolly sedge provide important habitat for raptors, deer, and elk

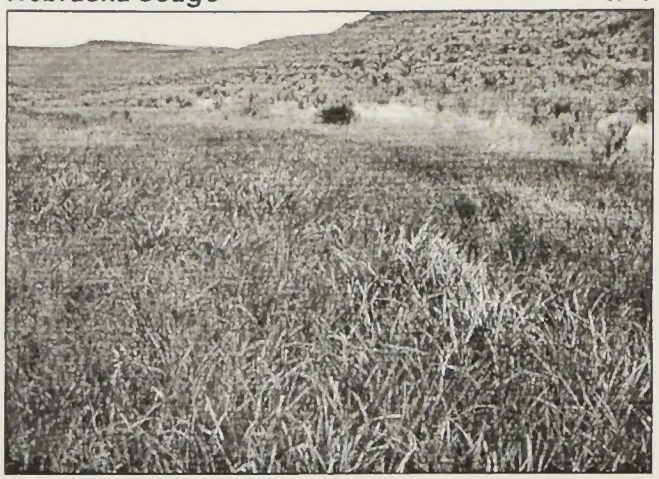
(Kovalchik, 1987). Wet stands of the type may provide nesting and feeding areas for waterfowl (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Hansen et al. (1995) included all combinations of *Carex lanuginosa, Carex lasiocarpa,* and *Carex buxbaumii* in the *Carex lasiocarpa* habitat type. There may be some similarities between sites supporting *Carex lanuginosa, Carex lasiocarpa*, and *Carex buxbaumii* plant associations. However, *Carex lanuginosa* stands typically occur along run-off dominated stream channels or headwater basins while *Carex lasiocarpa* and *Carex buxbaumii* occur in association with saturated spring-fed or groundwater driven wetlands. From a biodiversity conservation standpoint, the three associations should be recognized as distinct types. A distinct *Carex lanuginosa* plant association has been recognized and described in Oregon, Montana, Idaho, Utah, and Colorado.

Carex nebrascensis

Nebraska sedge **n=3**



RANGE

The *Carex nebrascensis* plant association has been documented in every western state, with the possible exception of New Mexico and Washington (Manning and Padgett 1995, Reid et al. 2000).

ENVIRONMENT

This association typically occurs at low to mid-elevations in the mountains, ca. 3,300 to 9,200 feet depending on latitude. It most often occurs in meadows and on broad alluvial terraces with fine-textured soils, but it is also found around seeps. Although stands can occur near streams and rivers, the high water tables found in this type appear to result from lateral subirrigation rather than fluvial flooding. Valley bottom widths can range from very narrow to very broad (typically moderate to broad). Gradients can range from very low to very high (typically low). It also occurs along a wide variety of Rosgen stream classes (Youngblood et al. 1985, Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997).

SOILS

The *Carex nebrascensis* association is mostly associated with deep, fine-textured mineral soils (Mollisols, Andisols, Entisols, and Inseptisols). It rarely occurs on organic substrates (Histisols). Water tables are typically at or near the surface, at least in the early growing season, occasionally dropping to more than 1 m. Estimated available water holding capacity is moderate to high (Youngblood et al. 1985, Padgett et al. 1989, Hansen et al. 1995, Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Stands of the *Carex nebrascensis* plant association are generally small and widely scattered on the landscape. *Carex nebrascensis* clearly dominates the vegetation, with generally minor amounts of other graminoids, including *Glyceria striata, Deschampsia cespitosa, Juncus balticus, Calamagrostis neglecta,* and *Poa pratensis,* among many others. Forb species present in the association are highly variable and typically sparse (Youngblood et al. 1985, Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997).

SPECIES	CON	COVER	MIN	MAX
FORBS				
Berula erecta	67	1.3	0	3
Epilobium ciliatum	100	1.7	1	3
Ranunculus cymbalaria	33	1.0	0	3
Veronica anagallis-aquatica	33	1.0	0	3
GRAMINOIDS				
Agrostis stolonifera	67	3.7	0	10
Carex nebrascensis	100	92.0	80	98
Eleocharis palustris	33	1.0	0	3
Hordeum brachyantherum	67	0.7	0	1
Juncus balticus	100	4.7	1	10
Muhlenbergia richardsonis	33	10.0	0	30
Puccinellia pauciflora	33	1.0	0	3

ADJACENT COMMUNITIES

Because of the wide elevational and geographical distribution, adjacent upland associations can range from sagebrush-steppe at the lower elevations to a diversity of montane and subalpine coniferous forest types. Adjacent riparian associations are equally diverse and include coniferous forest, deciduous forest, tall shrub, low shrub, and herbaceous associations.

MANAGEMENT CONSIDERATIONS

Carex nebrascensis, although an increaser in some associations, is very palatable to livestock. It is an excellent soil binder in wet meadows. Several studies suggest that management of this association should allow for regrowth at the end of the grazing season to replenish carbohydrate reserves for winter respiration and early spring growth. The typically wet, fine-textured soils are susceptible to compaction and hummocking by excessive livestock use particularly if the sod layer is broken and hummocks are present. Grazing value ratings are high for elk, cattle and horses, and medium for sheep and deer. The

erosion control potential rating is high. It is valuable for streambank stabilization because of its strong rhizomes and dense roots (Manning and Padgett 1995).

SUCCESSIONAL DYNAMICS

Some studies consider all stands of the *Carex nebrascensis* association to be a grazing disclimax (e.g., Hansen et al 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997), while others consider it to be the potential natural community in some cases (e.g., Youngblood et al. 1985, Padgett et al. 1989, Manning and Padgett 1995). These latter studies apparently sampled stands that they considered to have received little or no grazing pressure. *Carex nebrascensis* is strongly rhizomatous and robust, outcompeting other species that occupy similar sites, such as *Deschampsia cespitosa*. The dominance of *C. nebrascensis* may represent disturbance conditions because it can persist under heavy grazing. Under high quality conditions, however, increaser species (e.g., *Juncus balticus, Poa pratensis, Aster* spp., and/or *Trifolium* spp.) are either absent or present with low cover. While *Deschampsia cespitosa* may have once codominated some sites, the strongly rhizomatous habit of *C. nebrascensis* has likely facilitated its continued dominance. Once *C. nebrascensis* dominates a site, it should be considered the potential natural community for these sites (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

Carex nebrascensis is palatable to elk and provides food and cover for waterfowl (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Classification of this association is based on many plots from many studies in Oregon, Nevada, Idaho, California, Montana, Wyoming, Utah, and Colorado.

Carex praegracilis

Clustered field-sedge

RANGE

The *Carex praegracilis* plant association is reported from Idaho, Oregon, Colorado, Wyoming, Montana, and California. It is a frequently encountered association on the lower Boise and Payette rivers.

ENVIRONMENT

The *Carex praegracilis* plant association is found on a variety of landforms ranging from subirrigated moist meadows to floodplains of large rivers. The association is typically found at middle to lower elevations.

SOILS

Soils are deep and range from heavy clays to sandy clay loams with mottling and may be alkaline (Kittel et al. 1999). Soils are saturated early in the growing season and dry at the surface by mid-summer.

VEGETATION COMPOSITION

Carex praegracilis is the dominant graminoid on high quality sites with continuous (90%) cover in some locations. Other species that may be present include *Carex nebrascensis, Eleocharis palustris, Juncus balticus,* and *Elymus triticoides.* On alkaline sites *Distichlis spicata* and *Muhlenbergia asperifolia* may be present.

ADJACENT COMMUNITIES

Stands of *Carex praegracilis* typically occupy a complex mosaic made up of patches of *Typha latifolia, Scirpus* spp., *Carex nebrascensis, Carex lanuginosa, Distichlis spicata, Agropyron smithii, Elymus triticoides, Juncus balticus,* and *Pentaphylloides floribunda.*

MANAGEMENT CONSIDERATIONS

Carex praegracilis is rated as highly palatable to cattle and moderately palatable to sheep and horses. Meadows are often used as irrigated hay pasture and cows are reported to get a good gain on *C. praegracilis* hay. The rhizomatous habit of *Carex praegracilis* allows it to persist with annual haying and grazing. Stands are susceptible to compaction if disturbed in early spring or summer. Heavy use can decrease stand area and allow other species to become dominant. This species is useful for revegetation and can be planted from commercially available seed or from transplants (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

Little is known about the successional pattern of *Carex praegracilis* dominated areas.

WILDLIFE FUNCTIONS

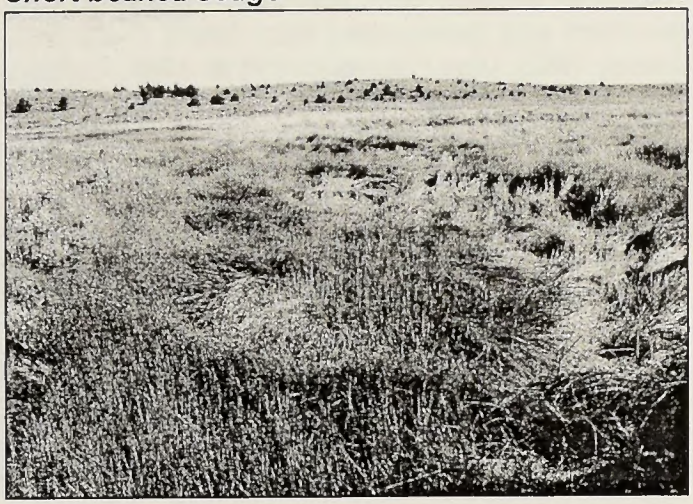
Carex praegracilis is considered good forage for elk and is valued as winter forage. It will function as a streambank stabilizer and stabilize overhanging banks for fish habitat (Elzinga and Rosentreter 1999). Meadows supporting *Carex praegracilis* provide nesting habitat for wrens, rails, and other birds.

CLASSIFICATION COMMENTS

The *Carex praegracilis* plant association is classified by a limited number of quantitative vegetation plots sampled in Colorado (2 plots), Oregon (3 plots), and Idaho (1 plot) (Crowe and Clausnitzer 1997, Moseley 1998, Kittel et al. 1999). This association is typically found at lower elevations where much of the land is in private ownership and only limited sampling has occurred. Some stands do support near monocultures of the diagnostic species. However, hydrologic fluctuations (both natural and human caused) and ground disturbance seem to favor more diverse stands with a mix of mesic graminoids including *Carex praegricilis, C. nebrascensis, Juncus balticus, Eleocharis palustris, Agropyron smithii,* and *Elymus triticoides.* Mixed graminoid stands are difficult to classify, especially when no species shows clear dominance.

Carex simulata

Short beaked sedge **n=1**



RANGE

The *Carex simulata* association is a minor, although widespread, type which occurs in the montane valleys throughout southern and south central Idaho; the Wyoming Range and the Yellowstone Plateau of northwestern Wyoming (Youngblood et al. 1985), the Uinta Mountains and Wasatch Plateau of Utah (Padgett et al. 1989), the mountains of Montana (Hansen et al. 1995), the Rio Grande and Closed Basins of Colorado (Kittel et al. 1999), and is scattered throughout central Oregon (Kovalchik 1987).

ENVIRONMENT

Stands are located in wet depressions such as broad meadows, toeslope seeps or gentle slopes below seeps, flat alluvial terraces adjacent to streams, and swales formed by abandoned channels.

SOILS

Soils of the *Carex simulata* plant association are somewhat variable. Although the degree of organic matter decomposition varies, stands are often associated with organic soils rather than highly decomposed mineral soils (Padgett et al. 1989). Kovalchik (1987) describes soils of this association as organic loam and sedge peats. This type may also be found on poorly drained, fine textured mineral soils (Hansen et al. 1995) or fine loams and clays with organic surface horizons of thick (cumulic) mollic epipedons as well (Youngblood et al. 1985).

VEGETATION COMPOSITION

Carex simulata dominates stands and may have up to 100% cover. *Carex simulata* may not always be the dominant species, but it is an indicator for this association. Moss cover is typically high. Low species diversity, with *Carex aquatilis, C. utriculata, Deschampsia cespitosa,* and *Juncus balticus* being the only associates with high constancy, is characteristic. The shrubs *Pentaphylloides floribunda, Salix wolfii,* and *S. brachycarpa* are sometimes present. The most common forbs include *Pedicularis groenlandica* and *Swertia perennis.*

SPECIES	CON	COVER	MIN	MAX
FORBS				
Epilobium ciliatum	100	1	1	1
Lemna minor	100	1	1	1
Ranunculus cymbalaria	100	1	1	1
GRAMINOIDS				
Carex nebrascensis	100	1	1	1
Carex simulata	100	98	98	98
Juncus balticus	100	1	1	1
Puccinellia pauciflora	100	1	1	1

ADJACENT COMMUNITIES

Wetter sites are dominated by *Scirpus acutus*, open water (Hansen et al. 1995), *Carex utriculata,* or *Carex aquatilis* (Padgett et al. 1989). Stands of *Pentaphylloides floribunda/Deschampsia cespitosa* are common on drier sites (Hansen et al. 1995), while uplands may be dominated by *Pinus contorta, Picea engelmannii, Populus tremuloides,* shrub-steppe, or dry grasslands (Padgett et al. 1989).

MANAGEMENT CONSIDERATIONS

Carex simulata appears able to withstand moderate grazing pressures, though impacts on soils may include hummocking and pitting if stands are used when sites are wet (Padgett et al. 1989). Hummocked meadows will continue to support *Carex simulata* if water table levels are maintained (Elzinga and Rosentreter 1999). Stands are generally too wet to burn except in the fall. Postfire recovery from resprouting rhizomes is rapid unless the soil surface becomes dry, organic soils become flammable, and fire penetrates the soil destroying sedge rhizomes (Kovalchik 1987). Transplanted rhizomes can be used for restoration of riparian and wetland habitat. Seed, while less effective, may also be used (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

The strongly rhizomatous *Carex simulata* appears to form a dense, stable association (Padgett et al. 1989). Continually high water tables limit the successful establishment of most other species. Due to the season-long high water table, the sites are

often inaccessible and minimally disturbed (Hansen et al. 1995). Most reproduction is via rhizomes; seed is produced, but germination rates are low (Elzinga and Rosentreter 1999).

WILDLIFE FUNCTIONS

The dense stands created by *Carex simulata* provide cover for waterfowl and small mammals. Where stands vegetate stream channels, they provide good bank stability and may create overhanging banks for fish (Elzinga and Rosentreter 1999). This type may provide early spring forage for deer when adjacent uplands are still covered by snow (Kovalchik 1987).

CLASSIFICATION COMMENTS

The *Carex simulata* plant association has been well described and documented from Idaho (Tuhy and Jensen 1982), Utah (Youngblood et al. 1985, Padgett et al. 1989), Montana (Hansen et al. 1989), Oregon (Kovalchik 1987), Colorado (Kittel et al. 1999) and California (Nachlinger 1985).

Carex utriculata

Bladder sedge

RANGE

This plant association occurs in Oregon (Kovalchik 1987), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), Idaho, Wyoming (Youngblood et al. 1985, Jones and Walford 1995), Montana (Hansen et al. 1995), and Colorado (Kittel et al. 1999).

ENVIRONMENT

This association is widespread at moderate to high elevations in the mountains, but rarely found in low-elevation valleys or on volcanic plains. It occurs in a wide variety of landscape settings, such as narrow to broad valley bottoms, meadows, seeps, and stream terraces. It is commonly associated with ponds and sloughs that have silted in. It can occur in standing water or on sites that become relatively dry during the latter part of the growing season. Valley bottom gradients are low (Padgett et al. 1989, Hall and Hansen 1997).

SOILS

Soils are classified as Histisols, Mollisols, Inceptisols, and Entisols. Mineral soils are generally rich in organic-matter and often have an incipient histic epipedon at the surface. These soils may eventually become Histisols. Most of the mineral soils are fine-textured and have high water holding capacity. The soils are saturated well into the summer and the water table is usually within 50 cm of the surface late into the growing season (Crowe and Clausnitzer 1997, and others).

VEGETATION COMPOSITION

Carex utriculata typically exhibits monospecific dominance with dense cover. *Carex nebrascensis, C. simulata, C. aquatilis,* and/or *Juncus balticus* may be present but are usually not abundant in this species-poor association. Litter often accumulates and few species can establish on these organic, permanently saturated or inundated soils. This is why willows are rarely present (Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997).

ADJACENT COMMUNITIES

Because of this association's wide elevational and geographical distribution, adjacent upland associations can range from sagebrush-steppe at the lower elevations (rare) to a diversity of montane and subalpine coniferous forest types.

MANAGEMENT CONSIDERATIONS

Though *C. utriculata* produces large amounts of herbage every year, it apparently is relatively unpalatable to livestock, especially as it matures. It is a coarse sedge with high amounts of silica in its leaf cells. The dense network of rhizomes and roots provide excellent streambank stabilization and frequently form overhanging banks associated with good fish habitat. These banks may slump if subjected to heavy grazing or trampling (Hansen et al. 1995). This is a good species for restoration. Transplanted rhizomes or commercially available or collected seed can be used (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

Carex utriculata is a widespread species that occupies mineral or organic soils with seasonably high water tables. This association typically colonizes recently formed ponds and/or sites in or adjacent to low-gradient stream channels. It has been observed that *C. utriculata* has higher cover on sites that are seasonally flooded; continually inundated sites had decreased shoot density. It can colonize permanently flooded sites, often doing so from the outer edge. As soil and litter build up, these sites are more conducive to increased *C. utriculata* dominance. This species is relatively long-lived and is the climax vegetation on suitable sites. As soil moisture decreases, other species such as *C. nebrascensis, C. simulata,* or *Deschampsia cespitosa* may replace *C. utriculata* (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

This association performs a vital role in maintaining water quality and aquatic health in headwater streams. Past beaver activity is often evident in this plant association, and *Carex utriculata* is one of the species likely to pioneer newly flooded beaver ponds. Palatability appears to be lower than other sedges such as *Carex nebrascensis* or *C. aquatilis* (Padgett et al. 1989). Rhizomes and sprouts are important food for muskrats and are occasionally eaten by waterfowl (Elzinga and Rosentreter 1999). *Carex utriculata* provides valuable breeding and feeding ground for waterfowl and snipe. Common yellowthroats, red-winged blackbirds, song sparrows, and tree swallows are commonly associated with this association (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

Carex utriculata plant associations have been described in Oregon (Kovalchik 1987), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), Montana (Hansen et al. 1995), Idaho, Wyoming (Youngblood et al. 1985), and Colorado (Kittel et al. 1999). This sedge forms near monocultures and the plant association is easily identified. Identification can be complicated as some sedges including *Carex vesicaria, C. atherodes,* and *C. aquatilis,* have similar growth forms and occupy similar habitat.

Danthonia californica

California oatgrass **n=4**

RANGE

Danthonia californica dominated plant associations are known from Washington, Oregon, Idaho, and California (Sawyer and Keeler-Wolf 1995, Moseley 1998, 1999, Reid et al. 2000, Rust et al. 2000). The *Danthonia californica* ephemeral wetland plant association described here is only known from the Owyhee Uplands. Specifically, it has been sampled on the plateau breaks of the East and South Forks of the Owyhee River, on Juniper Mountain, and on the tablelands between Juniper Mountain and the North Fork Owyhee River (Moseley 1998, 1999, Rust et al. 2000).

ENVIRONMENT

In Idaho, the *Danthonia californica* plant association is found as stringers along shallow ephemeral drainages, and in vernally moist swales and areas of poor drainage. It is known at elevations ranging from 5,240 to 6,085 feet in the Owyhees (Moseley 1998 and 1999, Rust et al. 2000). The ephemeral drainages annually carry runoff from snowmelt and large rainfall events. They are located on both gently rolling basaltic plateaus and in incised rhyolitic tablelands. Drainages are less than 1% gradient and average 7 m wide (though actual water channels are often narrow) (Moseley 1998, 1999). The bottoms of ephemeral drainages are very rocky on basalt (cobbles, stones, and boulders make up 40 to 50% of exposed ground) and coarse gravelly loam on rhyolite (Moseley 1998, 1999, Rust et al. 2000). *Danthonia californica* also forms meadows in vernally moist swales (with outlets for drainage) and in meadow complexes with poor drainage or a shallow water table. In these habitats, this association is found on slightly drier meadow edges and raised micro-sites (Rust et al. 2000).

SOILS

In ephemeral drainages soils are very coarse and include loams with a significant amount of gravel. Soils in meadows are fine textured with minimal gravel and noticeable moss and litter cover.

VEGETATION COMPOSITION

In Idaho, the vegetation of the *Danthonia californica* ephemeral wetland plant association can be divided into two sub-types; an ephemerally wet meadow and an ephemeral drainage sub-type. *Danthonia californica* dominates both types forming a moderately dense bunchgrass turf with 30 to 50% cover (Moseley 1998, 1999, Rust et al. 2000). Associated herbaceous species diversity is high but their cover and constancy are quite variable. In meadows, numerous prominent graminoids (with cover usually 5% or greater) occur with *Danthonia californica*. These include, in order of importance, *Poa pratensis, Juncus* spp. (*Juncus tenuis, J. balticus,* and others), unknown *Poa* sp., *Muhlenbergia richardsonis*, *Carex* spp. (*Carex athrostachya, C. douglasii, C. nebrascensis,* and others), *Stipa columbiana, Agrostis stolonifera,* and *Eleocharis* spp. (Rust et al. 2000). Other species indicative of ephemeral drainage and vernal pool habitats, but with only trace cover and constancy, include *Eleocharis bolanderi, Navarretia intertexta,* and *Polygonum kelloggii.* Species, all with trace cover and constancy, indicative of lithosolic soil with shallow depths to clay-pan or impervious volcanic bedrock include: *Antennaria luzuloides, Castilleja pallescens, Erigeron chrysopsidis, Eriogonum caespitosum, Microseris nutans,* and *Trifolium macrocephalum.*

ADJACENT COMMUNITIES

In Idaho, communities adjacent to the *Danthonia californica* plant association in drainages are dominated by *Artemisia arbuscula, Juniperus occidentalis*, and occasionally *Artemisia papposa* (Moseley 1998, 1999). Wetter communities adjacent to *Danthonia californica* meadows are dominated by *Carex nebrascensis, Carex* spp., *Juncus balticus*, and occasionally *Populus tremuloides/Rosa woodsii* (Rust et al. 2000). Upland plant associations immediately bordering *Danthonia californica* include *Juniperus occidentalis/Artemisia tridentata* ssp. *vaseyana/Festuca idahoensis,* other *Juniperus occidentalis* stands, *Artemisia tridentata* ssp. *vaseyana* or ssp. *wyomingensis/Festuca idahoensis,*

and *Artemisia arbuscula/Festuca idahoensis* (Moseley 1998, 1999, Rust et al. 2000).

MANAGEMENT CONSIDERATIONS

Danthonia californica is grazed by livestock and described as highly palatable (USDA 1999). The rocky nature of ephemeral drainage sites, however, limits over-use by cattle (Moseley 1998, 1999). Cattle may be attracted to the associated *Poa* spp. and *Carex* spp. in this association, especially in meadow sites. The fine-textured soils of *Danthonia californica* meadows are susceptible to compaction by livestock over-use and vehicle traffic, especially when saturated (Rust et al. 2000). The resultant changes in water drainage may limit the extent of this association on formerly suitable sites. *Danthonia californica* appears easily up-rooted by livestock grazing and traffic, especially on looser gravelly soils (Rust et al. 2000). The morphologically similar species *Danthonia unispicata* is identified as a grazing decreaser on ephemerally moist scabland sites in the Blue Mountains (Johnson and Simon 1987, USDA 2000). *Danthonia californica* is a short-lived perennial bunchgrass that spreads at a moderate rate (USDA 1999). It is fire resistant but does not re-sprout. Since seed set is early (late spring) and seeds readily fall to the ground, summer-fall grazing would have the least impact on *Danthonia californica's* long-term persistence at a site (USDA 1999).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Artemisia arbuscula	50	1.0	0	3
FORBS				
Arenaria congesta	75	1.3	0	3
Epilobium brachycarpum	50	0.5	0	1
Haplopappus uniflorus var howellii	50	3.3	0	10
GRAMINOIDS				
Danthonia californica	100	37.5	30	50
Juncus tenuis	25	1.3	0	5
Poa nevadensis	50	1.0	0	3
Poa pratensis	25	1.3	0	5
Poa secunda	50	3.3	0	10
Sitanion hystrix var hordeoides	50	0.5	0	1

SUCCESSIONAL DYNAMICS

Danthonia californica is a short-lived perennial grass with moderate rates of seed and vegetative spread (USDA 1999). It commonly forms climax meadow communities on suitable sites in Washington, Oregon, and California. *The Danthonia californica* ephemeral wetland plant association is uncommon in Idaho but forms stable, distinctive communities in ephemeral drainages and swales. It appears closely related to the *Juniperus occidentalis* ephemeral drainage and *Artemisia arbuscula* ephemeral drainage associations (Moseley 1998, 1999, Rust et al. 2000). *Juniperus occidentalis* and *Artemisia arbuscula* are occasionally observed on the edges of this association. Slight drying of *Danthonia californica* dominated sites (e.g., by soil compaction, overgrazing, or other hydrologic changes) may promote their invasion. *Danthonia californica* meadows degraded by excessive cattle grazing apparently convert to exotic grasses, mainly *Poa pratensis, Agrostis stolonifera*, and *Phleum pratense* (Rust et al. 2000). Excessive flooding of *Danthonia californica* meadows could promote conversion to *Carex nebrascensis* or *Juncus balticus* stands.

WILDLIFE FUNCTIONS

Information on the value of *Danthonia californica* for wildlife is lacking. *Danthonia californica,* as well as other associated graminoids, are highly palatable for grazing animals (USDA 1999). *Danthonia unispicata,* a similar species, is valued by wildlife, especially pocket gophers, for its succulent bases, but is otherwise only fair in palatability (USDA 2000).

CLASSIFICATION COMMENTS

Numerous classifications from Oregon and California have described *Danthonia californica* dominated associations. Associations from California, Oregon, and Washington, all west of the Cascade-Sierra crest, include *Danthonia californica* valley grassland, *Danthonia californica-Festuca rubra, Danthonia californica-Arrhenatherum elatius, Danthonia californica-Sitanion hystrix, Danthonia californica-Muhlenbergia filiformis,* and *Deschampsia cespitosa-Danthonia californica.* These communities share some similar species and genera with Idaho's *Danthonia californica* ephemeral wetland plant association (Sawyer and Keeler-Wolf 1995, Moseley 1998, 1999, Rust et al. 2000). Further sampling may better elucidate their relationships. For now, however, Idaho's *Danthonia californica* ephemeral wetland will be considered separate. There is also a very similar *Danthonia californica-Festuca idahoensis* plant association documented from impervious tablelands above the East Fork Owyhee River. This community should probably be included with the *Danthonia californica* ephemeral wetland plant association.

Distichlis spicata

Inland saltgrass

RANGE

Stands of *Distichlis spicata* are known from across the western United States and Saskatchewan. It is found in semi-arid and arid regions with intermittent flooding. It is known from the western Great Plains, Intermountain Region and southwestern U.S. from New Mexico to Montana and west to Washington, Oregon and California. It is also likely to occur in Mexico (from Reid et al. 1999). It is a frequently encountered association on the lower Snake, Boise, and Payette Rivers.

ENVIRONMENT

Stands of *Distichlis spicata* occupy saline or akaline basins, swales, pond and lake margins, river terraces, and seep areas that are intermittently flooded (Hansen et al. 1995). Water tables are usually at or slightly below the surface. Soils are commonly alkaline with a high concentration of soluble salts (Hansen et al. 1995).

SOILS

Soil textures vary from sandy clay to sandy loams to sandy clay loams with cobbles and gravel (Kittel et al. 1999). Soils are deep and generally have an impermeable layer and are thus poorly drained (Reid et al. 1999).

VEGETATION COMPOSITION

Distichlis spicata occurs in nearly pure stands with sparse to dense cover. Higher cover and species diversity are positively correlated with higher moisture in wet years and near boundaries with other vegetation associations. High soil salinity favors *Distichlis spicata* over other species though very high salinity may dwarf and reduce cover of *Distichlis*. Species associated with high salinity sites may include *Puccinellia nuttalliana, Triglochin maritimum, Salicornia rubra,* and *Suaeda* spp. Species from areas with lower salinity may include *Juncus balticus, Scirpus maritimus, S. nevadensis, Hordeum brachyantherum, H. jubatum, Agropyron smithii*, and *Muhlenbergia asperifolia* (Jankovsky-Jones et al. 2000, Reid et al. 1999).

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by *Scirpus acutus, Scirpus americanus, Scirpus maritimus, Scirpus nevadensis,* or open water. Drier sites may be dominated by *Sarcobatus vermiculatus, Artemisia tridentate,* or other upland types (Hansen et al. 1995). *Agropyron smithii, Elymus triticoides, Carex praegracilis,* and *Sporobolus airoides* have been observed adjacent to this type in southwest Idaho.

MANAGEMENT CONSIDERATIONS

Forage production in this type is low due to the unpalatible nature of the diagnostic graminoid. The high clay content and saline nature of the soils make them susceptible to compaction problems and limit the practicality of development. On degraded alkaline sites, *Distichlis spicata* may be planted and tends to do quite well due to the rhizomatous growth form (Hansen et al. 1995). *Bromus tectorum, Hordeum jubatum,* and weedy forbs (e.g., *Atriplex* spp., *Bassia hyssopifolia)* can invade on slightly drier degraded sites.

SUCCESSIONAL DYNAMICS

Distichlis spicata is tolerant of low to moderately alkaline soils. It is a warm season grass growing from early summer to fall spreading primarily by rhizomes (Kittel et al. 1999). Sites supporting *Distichlis spicata* have an intermittent flooding regime that, when combined with a high evaporation rate in dry climates, causes accumulations of soluble salts in the soil. At some sites, vegetation forms zones where species abundance and composition is stratified by salt tolerance. For example, in playas soil salinity typically increases from the edge to the center allowing for several concentric vegetation zones. Microtopography can also affect vegetation composition. Accumulation of soil may form hummocks where plants with less salt and alkali tolerance can occur (Reid et al. 1999).

WILDLIFE FUNCTIONS

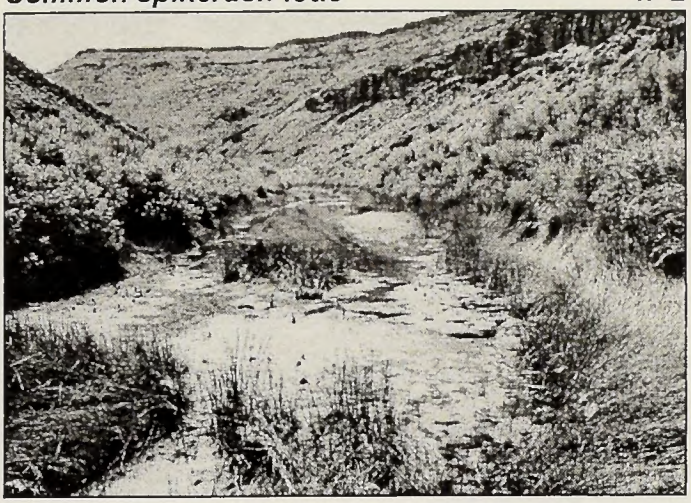
Distichlis spicata is a tough, course plant that is of low to fair palatability for livestock and wildlife. It does provide cover for small wildlife species, forming a dense sod that provides good concealment. Pure stands of saltgrass provide nesting sites for numerous species of ducks and shorebirds (USDA 2000). Stands may be used for foraging by northern harriers and other species of raptors.

CLASSIFICATION COMMENTS

The classification of vegetation stands dominated by *Distichlis spicata* is difficult for two reasons. First, *D. spicata* is a widespread halophytic grass species that dominates or codominates the herbaceous layer of many different associations. This results in many closely related associations where this grass is a diagnostic species. Secondly, most of these related associations have an intermittent, temporary, seasonal, or tidal flood regime. These flood regimes sometimes separate vegetation that otherwise is very similar. For example, the flood regime that separates this plant association from associations in the *Distichlis spicata-Hordeum jubatum* Temporarily Flooded Alliance can be somewhat arbitrary in regions that have large year-to-year variation in precipitation (Reid et al. 1999). A related *Distichlis spicata-Scirpus nevadensis* plant association is listed as occurring in Idaho and other western states. Documentation for this community, in Idaho at least, is limited. Closely related plant associations have been described with a variety of associated species. The association described here includes nearly pure stands of *Distichlis spicata* and stands with a high number of associates may be tied to more mesic zones, areas with lowered alkalinity, or disturbed sites.

Eleocharis palustris lotic

***Common spikerush* lotic** **n=2**



RANGE

Eleocharis palustris is a common type in California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and Saskatchewan. It has been documented from essentially every western state except Arizona and New Mexico (Bourgeron and Engelking 1994, Anderson et al. 1998).

ENVIRONMENT

The *Eleocharis palustris* plant association is found at low to moderate elevations, generally in wide, low gradient valleys of all shapes. Sites are wet basins, floodplains, meadows, gravel bars, and lake edges. It is typically in sites that are prone to yearly flooding or persistent surface water. Where streams are present, they are Rosgen's C and E stream types. Elevations range from 2,200 to at least 8,700 feet, depending on latitude (Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997).

SOILS

Soils of this plant association are classified as Mollisols, Entisols, Histisols, and Inseptisols. Textures are variable, ranging from sites that are very coarse-fragment rich to others that are deep and fine-textured. The surface is usually high in organic matter and the litter accumulation may blend into rich, black organic muck soils. The fine-textured upper horizons often arise from alluvial deposition. Sands, gravels, and cobbles usually constitute the main body of deeper subsurface materials (Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997).

VEGETATION COMPOSITION

Eleocharis palustris is an aggressive, rhizomatous species that nearly excludes all other species from establishing any significant cover. Common associates in high quality sites include *Alopecurus aequalis, Mentha arvensis, Rumex crispus, Eleocharis acicularis, Carex utriculata, C. lanuginosa, Glyceria* spp., and *Phalaris arundinacea.* On some sites, aquatic species such as *Hippuris vulgaris, Utricularia vulgaris,* and *Potamogeton natans,* have high cover.

SPECIES	CON	COVER	MIN	MAX
FORBS				
Mentha arvensis	100	2	1	3
Rumex crispus	100	1	1	1
Alisma plantago-aquatica	50	0.5	0	1
Aster ascendens	50	0.5	0	1
Iris missouriensis	50	0.5	0	1
Lemna minor	50	0.5	0	1
Potamogeton pectinatus	50	0.5	0	1
Ranunculus cymbalaria	50	0.5	0	1
Senecio serra	50	0.5	0	1
Taraxacum officinale	50	0.5	0	1
FERNS/FERN ALLIES				
Marsilea vestita	50	0.5	0	1
GRAMINOIDS				
Carex lanuginosa	100	20.5	1	40
Eleocharis palustris	100	70	60	80
Alopecurus aequalis	50	0.5	0	1
Carex athrostachya	50	0.5	0	1
Hordeum brachyantherum	50	0.5	0	1
Juncus balticus	50	0.5	0	1
Juncus longistylis	50	0.5	0	1
Phleum pratense	50	0.5	0	1
Poa pratensis	50	0.5	0	1

ADJACENT COMMUNITIES

Due to the wide geographic distribution of this type, adjacent upland communities are varied, including shrub-steppe, woodland, and coniferous forest types. Adjacent riparian communities may be dominated by an equally varied assortment of types including deciduous forest, tall shrub, low shrub, and herbaceous communities.

MANAGEMENT CONSIDERATIONS

Seasonally wet conditions and low palatability of *Eleocharis palustris* limit the value of this type for livestock, even during drought years when upland

forage dries early and dies back (Kovalchik 1987). Sites occupied by this type are typically inundated or at least saturated for so much of the year as to preclude most development. Trampling damage and soil churning occurs readily with livestock use and may result in a shift toward more disturbance tolerant species such as *Hordeum jubatum, Carex nebrascensis,* and *Juncus balticus* (Hall and Hansen 1997).

SUCCESSIONAL DYNAMICS

Padgett at al. (1989) suggest that *Eleocharis palustris* is an early seral species on ponds and streambanks where water is at or above the ground surface. As siltation occurs over time, other communities, such as *Carex utriculata,* may replace it. However, due to the continual saturated conditions and dense growth of *Eleocharis palustris,* once formed, stands appear difficult to displace. They may persist as climax vegetation. If water levels rise, *Scirpus* spp. and *Typha latifolia* may be able to supplant *E. palustris.* Hansen et al. (1995) have observed that disturbance drastically shifts the vegetative composition of this type toward increaser or invader species such as *Hordeum jubatum.*

WILDLIFE FUNCTIONS

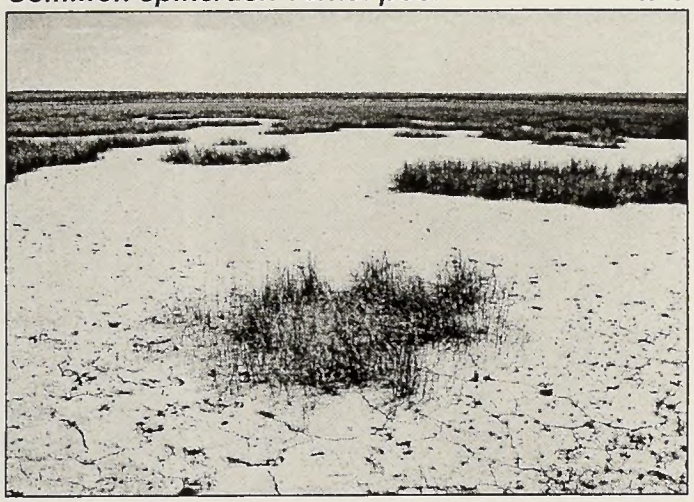
Broad zones of this type along streams, rivers, lakes, and reservoirs provide valuable feeding and nesting areas for waterfowl. *Eleocharis palustris* and associated plants are valuable sources of food and cover for waterfowl. Wild ungulates seldom browse this habitat type due to its low palatability (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

The *Eleocharis palustris* plant association is widespread and has been described in numerous classifications throughout the United States. In Idaho two plant associations dominated by *Eleocharis palustris* are recognized. The one described here represents stands that occur along streams, rivers, and lakeshores. An *Eleocharis palustris* vernal pool association is also recognized that occurs in vernal lake beds that dry completely by the end of the growing season. In some cases, *Eleocharis palustris* may be confused with *E. rostellata,* especially if the stolons of *E. rostellata* are not present or not obvious. Be sure of the plant's identity. A misidentification will result in the wrong community type and the sites on which they occur are very different ecologically.

Eleocharis palustris vernal pool

Common spikerush vernal pool **n=7**



RANGE

In Idaho, the *Eleocharis palustris* vernal pool association has been found on the volcanic Snake River Plain and the Owyhee Plateau. Stands were sampled in southwestern Idaho at YP Lake Bed, 45 Ranch, Rough Lake, and Owyhee Tablelands, as well as in east-central Idaho at Big Lost Sinks.

ENVIRONMENT

In Idaho, the *Eleocharis palustris* vernal pool plant association occurs on playas on basaltic plains. Stands of *Eleocharis* occur in the central portions of the lake beds that stay wet later in the growing season. The lake playas are internally drained and shallowly pool rain and snowmelt in the winter, spring, and occasionally early summer. While saturated during these periods, the playas soon dry to concrete hardness (Moseley 1998).

SOILS

This association occurs in vernal pools that accumulate fine-textured alluvium, generally silty clays, clay-loam, or silt-loam and are included in the Babbington-Piline association (Moseley 1998).

VEGETATION COMPOSITION

Eleocharis palustris clearly dominates all stands that were sampled in Idaho and usually has 50% or greater cover. Few species have high constancy, but some species that are present include *Marsilea vestita, Downingia bicornuta, Epilobium pygmaeum, Lemna minor, Machaerocarpus californicus, Navarretia intertexta, Porterella carnulosa, Potamogeton* spp., *Psilocarphus brevissima,* and *Ranunculus cymbalaria*. One sparse stand was sampled at YP Lake Bed with 3% cover of *Eleocharis palustris* and 3% cover of *Iva axillaris.*

ADJACENT COMMUNITIES

In some vernal pools, the central portion stays wet late into the growing season and when sites dry, they may support vernal annuals. Later in the year the central portion may appear as bare soil. Stands of *Artemisia cana* and *Muhlenbergia richardsonis* are commonly present on the outer margins of the pool. Uplands are dominated by sagebrush steppe vegetation. At the Big Lost Sinks, adjacent drier stands of vegetation are dominated by *Agropyron smithii.*

MANAGEMENT CONSIDERATIONS

Little information is available. Dealy (1971) states that there is extreme competition between livestock and deer for the few forbs that do occur in stands.

SUCCESSIONAL DYNAMICS

Vegetation within vernal pools is tied to zones that are saturated for various lengths throughout the growing season. The area occupied by the plant association is related to precipitation trends. During drought periods the area occupied by the *Eleocharis* plant association may decline and during wet cycles it may increase.

WILDLIFE FUNCTIONS

Comprehensive information on the importance of vernal pools to wildlife is not available for Idaho. It is probably safe to assert that these habitats are important spring stopover points for migratory waterfowl. However, one study in Idaho did look at the importance of freshwater crustaceans of vernal pools as a food source for early inhabitants of the Snake River Plain (Henrickson et al. 1998).

SPECIES	CON	COVER	MIN	MAX
FERNS				
Marsilea vestita	29	0.3	0	1
FORBS				
Machaerocapus californicus	14	7.1	0	1
GRAMINOIDS				
Eleocharis palustris	100	63	3	98

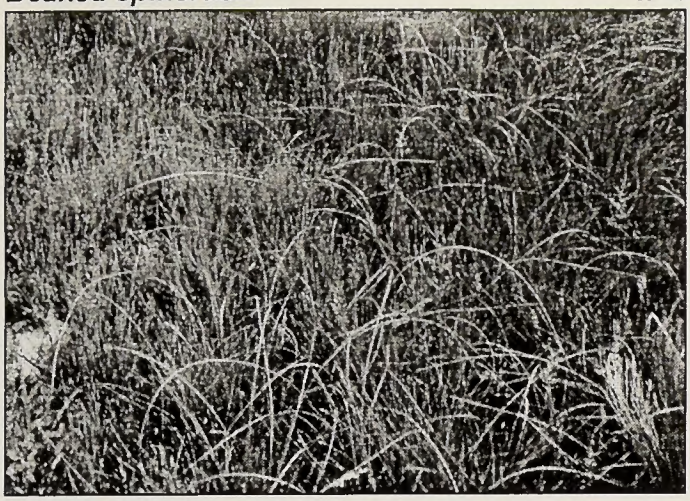
CLASSIFICATION COMMENTS

Eleocharis palustris is widespread and occurs in association with a variety of moisture and hydrology gradients. These habitats range from perennially wet stream courses to pond and lake margins to vernal pools that dry to concrete hardness late in the

growing season (Moseley 1998). In recognition of this diversity, two *Eleocharis palustris* dominated plant associations are recognized in Idaho. One association includes stands that occur along streams, rivers, and lakeshores. The association described here occurs in vernal lake beds that dry completely by the end of the growing season. Vernal pool associations described in California (Sawyer and Keeler-Wolf 1995) do not list *Eleocharis palustris* as an important species. Evans (1989) described a vernal pool in Grant County, Washington that was dominated by *Eleocharis palustris* and another vernal pool that had an *Eleocharis palustris* phase from mid-June to mid-July. In a study of vernal pools in eastern Washington, a zone dominated by *Eleocharis palustris* was identified (Crowe et al. 1994) that shares some associated species with Idaho stands. In the midwestern United States *Eleocharis palustris* is the diagnostic species in the *Eleocharis palustris – (Eleocharis compressa) – Leptochloa fascicularis* Playa Lake association (Langendoen 1999?). However, the Idaho association may be distinct as it has few species in common with the Midwest association.

Eleocharis rostellata

Beaked spikerush **n=4**



RANGE

Eleocharis rostellata is widespread from southern Canada to South America. It occurs in disjunct populations and may not be present in every state (USDA 2000). In the western United States, *Eleocharis rostellata* is a minor association in Idaho, Montana, Wyoming, and may occur in Washington, British Columbia, and Colorado.

ENVIRONMENT

This association occurs in thermal areas or areas with alkaline or calcareous soils, especially at the northern edge of its distribution. It is also found around cold springs in desert canyons. Water tables are at or near the surface throughout the year.

SOILS

This association is known to occur in a variety of soils ranging from relatively deep organic, to alkaline and calcareous soils, to coarse wet mineral soils that are directly in contact with thermal waters.

VEGETATION COMPOSITION

The association forms near monocultures and may occur as a quaking mat, or stands may be more open with considerable areas of bare soil, gravel, rock, and open water (Moseley 1995). Hansen et al. (1995) state that *E. rostellata* dominates a low (less than 30 cm) herbaceous layer. Moseley (1995) notes that there are two distinct phases of the communiti: stands with 90% cover of *E. rostellata*, occurring on relatively deep organic soils and sometimes forming a quaking mat; and stands with less than 70% cover that are more open, with considerable bare soil, gravel, rock, and open water on the surface. The open phase appears restricted to mineral substrates and occurs on gentle as well as very steep slopes.

Low species diversity is characteristic of the *E. rostellata* plant association. Common associated species with low cover include *Deschampsia cespitosa, Polypogon monspeliensis, Juncus balticus, Muhlenbergia asperifolia, Pentaphylloides floribunda, Aster ascendens, Berula erecta, Mimulus guttatus, Helianthus nuttallii, Castilleja exilis, Scirpus americanus, Carex simulata, C. nebrascensis,* and *C. scirpoidea.*

ADJACENT COMMUNITIES

Adjacent upland associations are often sagebrush-steppe or coniferous forest types. Adjacent riparian associations may be dominated by *Carex* spp., *Pentaphylloides floribunda,* and *Deschampsia cespitosa.* In southwest Idaho *Distichlis spicata* has been observed as an adjacent association.

MANAGEMENT CONSIDERATIONS

This association is threatened by development of thermal areas for recreation (Lesica 1990). Because of the wet, often unstable nature of the substrate, soil disturbance and grazing by livestock is probably minimal. Yet trampling damage of wet, organic soils in this association occurs with any livestock utilization. Livestock may graze plants in this association, but overgrazing can cause compositional changes to species of lower palatability (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Little is known about the successional dynamics of this association. It is reported to be an early colonizer of bare substrates. It is presumed to be a stable association once established, unless water tables are altered (USDA 2000).

SPECIES	CON	COVER	MIN	MAX
FORBS				
Berula erecta	75	1.25	0	3
Plantago major	50	0.5	0	1
GRAMINOIDS				
Agrostis stolonifera	100	1.5	1	3
Eleocharis rostellata	100	88.5	60	98
Polypogon monspeliensis	75	0.75	0	1
Carex lanuginosa	50	0.5	0	1
Juncus ensifolius	50	0.5	0	1

WILDLIFE FUNCTIONS

This association is a source of green forage early in the spring and attracts wildlife (especially elk and deer). Waterfowl will eat the stems, roots, and

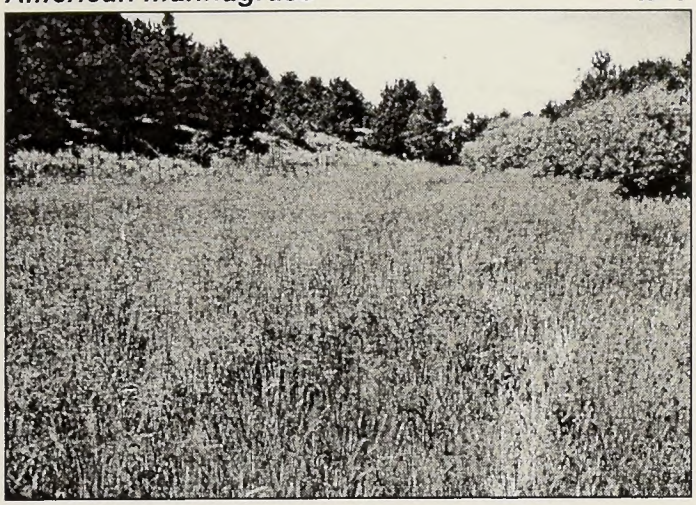
achenes of the dominant species (Hansen et al. 1995, USDA 2000).

CLASSIFICATION COMMENTS

In Montana, Hansen et al. (1995) lumped all combinations of *E. rostellata* and *E. pauciflora* into an *E. pauciflora* habitat type due to similarities in environmental conditions and management concerns. Observations in Montana by Lesica (1990) indicate that the *E. rostellata* association is distinct, and at least partially thermophilic, unlike the *E. pauciflora* type. In some cases, *Eleocharis rostellata* may be confused with *E. palustris,* especially if the stolons of *E. rostellata* are not present or not obvious. Be sure of the plant's true identity. A misidentification will result in the wrong plant association and the sites on which they occur are very different ecologically.

Glyceria grandis

American mannagrass **n=1**



RANGE

Stands have been documented from the Trout Creek Mountains in southeastern Oregon and the Owyhee Mountains of southwestern Idaho.

ENVIRONMENT

This association occurs in the mountains at elevations ranging from 5,600 to 7,300 feet. It occurs in narrow to broad V-shaped valleys with 5 to 6% gradients. It occupies low-lying bars and streamside terraces with saturated soils no more than 30 cm above the channel. Adjacent stream channel widths varied from 30 cm to almost 2 m. The Idaho occurrence is near a spring-fed channel, but the Oregon stands apparently are adjacent to more dynamic fluvial systems.

SOILS

Little soils information is available. Soils are saturated alluvium, usually immediately adjacent to a stream, and are often inundated early in the season. Textures are predominantly silty (Evenden 1989). Soils at the Idaho site were saturated season-long by a nearby spring.

VEGETATION COMPOSITION

The *Glyceria grandis* plant association is generally small in area, but is a distinctive feature of the riparian zone. *Glyceria grandis* is the dominant species. In Oregon, it had an average cover of 27%, while it had almost complete cover in the Idaho plot. Other graminoids with high constancy and variable cover include *Carex athrostachya, Juncus balticus, Eleocharis palustris,* and *E. pauciflora*. A variety of forbs that indicate saturated moisture conditions also occur, generally with low cover. They include *Mimulus guttatus, M. primuloides, Montia chamissoi, Rumex crispus, Epilobium ciliatum,* and *Alopecurus aequalis* (Evenden 1989).

ADJACENT COMMUNITIES

In Idaho, adjacent uplands are *Juniperus occidentalis* woodland. Adjacent riparian associations are dominated by *Salix geyeriana*.

MANAGEMENT CONSIDERATIONS

Soils are frequently unstable and inundated, which limits livestock use. Stands may be grazed if they dry out in the fall. The dominant species of this association is sensitive to heavy trampling and cover will decrease. Under light use it may increase (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

Little information is available on the successional dynamics in this association. The Idaho occurrence is in an exclosure that has been in place for between 30 and 50 years. It is not known if this association has persisted that long or whether it replaced something else during the protected period. This plant association was not seen outside of the exclosure.

WILDLIFE FUNCTIONS

The seeds of *Glyceria grandis* are eaten by waterfowl and songbirds. It is of limited value since seed production is not very high. The tall stems provide good cover for waterfowl and small mammals. *Glyceria grandis* is rated as highly palatable to elk, deer, and cattle, and moderately palatable to sheep (Elzinga and Rosentreter 1999).

SPECIES	CON	COVER	MIN	MAX
FORBS				
Epilobium ciliatum	100	1	1	1
Mimulus guttatus	100	3	3	3
Montia chamissoi	100	3	3	3
Rumex crispus	100	1	1	1
GRAMINOIDS				
Carex athrostachya	100	1	1	1
Eleocharis palustris	100	1	1	1
Glyceria grandis	100	98	98	98
Juncus ensifolius	100	3	3	3
Juncus orthophyllus	100	10	10	10

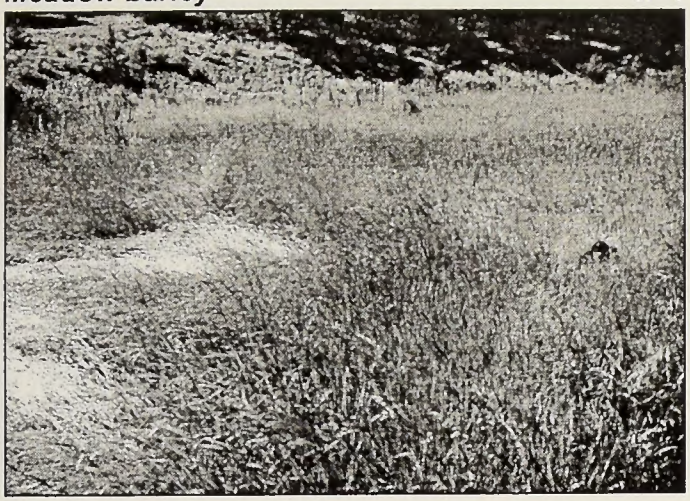
CLASSIFICATION COMMENTS

A *Glyceria borealis* plant association has been described from Idaho, Montana, Oregon, and

possibly Wyoming (Anderson et al. 1998). Crowe and Clausnitzer (1997) described a *Glyceria elata* plant association from northeastern Oregon. These two types are similar to the *Glyceria grandis* type in the genus of the dominant grass and are somewhat similar in landscape position, hydrology, and associated species.

Hordeum brachyantherum

Meadow barley **n=1**



RANGE

Manning and Padgett (1995) described this association from widely scattered locations in western, central, and northern Nevada. It has been sampled in the Owyhee Mountains of southwestern Idaho. It also known from a spring fed wetland on a terrace above the middle Snake River of central Idaho, and from a spring fed meadow in the Sublette Range of southeast Idaho.

ENVIRONMENT

This plant association is known from valleys and mountains, where it occurs at elevations ranging from 5,600 to 8,800 feet. It occurs along streams or in meadows (mostly), in valley bottoms that range from very narrow to very wide and have low to moderate gradients. Two sites in Nevada were along C3 and B3 stream channels (Manning and Padgett 1995). The Idaho sites are near headwater springs.

SOILS

All soils sampled in Nevada had thick mollic epipedons and, therefore, were all Mollisols. Soil particle size classes were clayey, silty, or fine-loamy. The depth to the water table in Nevada was greater than three feet (Manning and Padgett 1995). Soils at the Idaho site were seasonally to semi-permanently saturated.

VEGETATION COMPOSITION

Hordeum brachyantherum typically forms a continuous layer with cover ranging from 25 to near 100%. Cover of graminoid associates varies and may include *Carex douglasii, C. microptera, C. athrostachya, Agropyron trachycaulum, Deschampsia cespitosa, Poa nevadensis, Eleocharis palustris,* and/or *Poa pratensis.* The forb cover is very sparse and is characterized by *Aster* spp., *Epilobium* spp., *Mimulus guttatus, Iris missouriensis,* and *Rumex crispus* (Manning and Padgett 1995).

ADJACENT COMMUNITIES

Adjacent upland associations include *Artemisia tridentata* ssp. *vaseyana, Artemisia arbuscula, Pinus contorta,* and *Juniperus occidentalis* types. Adjacent riparian associations may be dominated by *Salix geyeriana, S. lemmonii, Carex* spp., *Iris missouriensis,* and *Glyceria grandis* types.

MANAGEMENT CONSIDERATIONS

Hordeum brachyantherum has low to moderate resource value rating for all livestock and a high rating for mule deer in the spring. Because of its tufted habit, *H. brachyantherum* has low to moderate potential for streambank stabilization. Heavy livestock grazing will result in the replacement of this type with other less desirable types. In addition, surface soil compaction from livestock is probable in this association due to the typically fine-textured particle size and moist condition (Manning and Padgett 1995).

SPECIES	CON	COVER	MIN	MAX
FORBS				
Aster ascendens	100	1	1	1
Epilobium brachycarpum	100	1	1	1
Epilobium ciliatum	100	1	1	1
Madia gracilis	100	1	1	1
Montia chamissoi	100	1	1	1
Rumex crispus	100	1	1	1
GRAMINOIDS				
Carex athrostachya	100	1	1	1
Eleocharis palustris	100	3	3	3
Hordeum brachyantherum	100	98	98	98
Poa pratensis	100	1	1	1

SUCCESSIONAL DYNAMICS

Manning and Padgett (1995) suggest that *Hordeum brachyantherum* is an early seral species. It can be replaced by other native mesic graminoids if left undisturbed. However, the stand sampled in Idaho is within an exclosure that has been in place from between 30 and 50 years. It can maintain dominance with grazing, although excessive use will lower vigor and cover, and increase cover of various *Aster* spp., *Potentilla gracilis,* and/or *Juncus balticus.* The *H. brachyantherum* plant association typically occurs on sites similar to the *Agrostis stolonifera* type and has seral status similar to the *Poa nevadensis* plant

association. *Poa nevadensis* and *H. brachyantherum* are often present together and may codominate in some Nevada stands (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

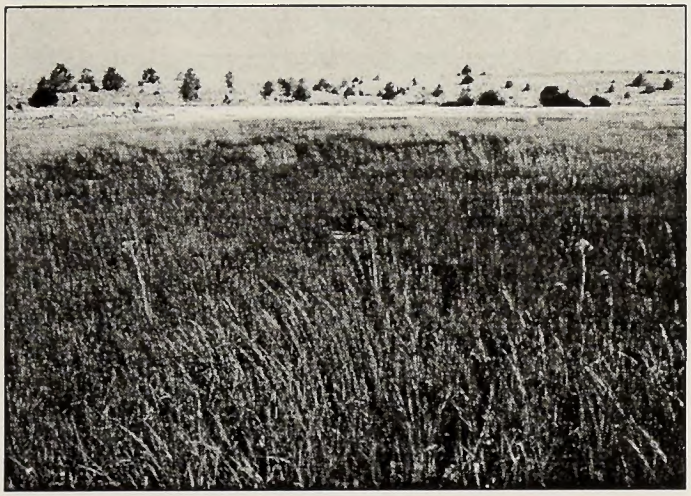
Hordeum brachyantherum is only moderately palatable to livestock and big game with palatability declining in the latter part of the growing season. Small mammals and waterfowl may make limited use of *H. brachyantherum* leaves and seeds for food (Elzinga and Rosentreter 1999).

CLASSIFICATION COMMENTS

This association has been quantitatively defined by Manning and Padgett (1995) from eastern and northern Nevada, supplemented with one plot and one observation from southern Idaho. The *Poa nevadensis* plant association is closely related to this plant association. According to Manning and Padgett (1995), if a stand in which both species occur is clearly dominated by *Poa nevadensis,* it is placed in the *Poa nevadensis* plant association. If they have more or less equivalent cover, the stand is placed in the *Hordeum brachyantherum* plant association. Their observations suggest that site conditions must be fairly moist for the *Hordeum brachyantherum* type, while they are usually much drier for the *Poa nevadensis* type.

Juncus balticus

Baltic rush **n=4**



RANGE

The *Juncus balticus* plant association has been documented from every state in the western United States, with the exception of Arizona (Reid et al. 2000).

ENVIRONMENT

The elevational range occupied by stands of *Juncus balticus* is as wide as the geographic range, ranging from 3,000 feet in Montana and Idaho to over 10,000 feet farther south. Throughout its range it occurs near seeps, in meadows, and on alluvial terraces. Where streams are present, the Rosgen reach types have been identified as B3, B4, C3, C4, C6, E4, E6, and F4. Surface topography is usually level or sometimes undulating or hummocky. Valley bottom characteristics are equally diverse, with widths ranging from very narrow to very broad and gradients from low to high (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997).

SOILS

This plant associaton typically occurs on fine-textured surface soils. Textures range from silt to sandy-loam. The water table ranges from the surface to ca. 50 cm below the surface, occasionally falling below 1 m by the end of the summer. Estimated available water-holding capacity ranges from low to high. Horizon "A" soils have been classified as Mollisols, Inceptisols, and Histisols. Soil reaction ranges from neutral to mildly alkaline, pH 7.0 to 8.0 (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Baltic rush dominates stands with canopy cover generally over 50%, usually higher. In southwestern Idaho *Carex nebrascensis* and *Muhlenbergia richardsonis* are common associates. Cover by other graminoids is usually low, although *Poa pratensis* appears to be a common associate over the range of this type. There is a wide diversity of other graminoids and forbs, both native and exotic, that occur with low cover in *Juncus balticus* stands throughout its range (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Walford et al. 1997).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Rosa woodsii	50	0.5	0	1
FORBS				
Aster ascendens	50	0.5	0	1
Epilobium ciliatum	75	1.3	0	3
Plantago major	75	4.0	0	10
Potentilla gracilis	50	3.3	0	10
Rumex crispus	75	0.8	0	1
Taraxacum officinale	50	1.0	0	3
GRAMINOIDS				
Juncus balticus	100	62.5	30	80
Muhlenbergia richardsonis	100	11.8	1	40
Agrostis stolonifera	75	3.5	0	10
Carex nebrascensis	75	6.0	0	20
Hordeum brachyantherum	75	0.8	0	1
Poa pratensis	75	0.8	0	1
Poa nevadensis	50	0.5	0	1

ADJACENT COMMUNITIES

As expected with an association distributed over the western United States and having at least a 7,000-foot elevational range, the adjacent upland and riparian associations are diverse. Upland associations range from steppe and shrub-steppe at the lower elevations to alpine associations at the higher elevations.

MANAGEMENT CONSIDERATIONS

Grazing value ratings for *Juncus balticus* are moderate for cattle and low (except in the spring when rated medium) for sheep, horses, mule deer, and elk. *Juncus balticus* has vigorous rhizomes and a wide ecological amplitude. It is an excellent streambank stabilizer with dense fibrous roots that not only bind horizontally in the soil, but grow to a greater depth than other rhizomatous graminoids. It has high erosion control potential. Because of its

tenacious nature and relatively low palatability to livestock, this species is very important as a soil binder and streambank stabilizer. Planting *J. balticus* plugs in the flood plain of an incised but aggrading stream will enhance bank building by binding soils and trapping sediment (Manning and Padgett 1995).

SUCCESSIONAL DYNAMICS

Numerous studies state unequivocally that the *Juncus balticus* plant association is a livestock grazing-induced type (e.g., Evenden 1989, Hansen et al. 1995, Manning and Padgett 1989, Hall and Hansen 1997, Crowe and Clausnitzer 1997). Others hedge somewhat stating that many or most occurrences are grazing induced (e.g., Padgett et al. 1989, Walford et al. 1997). There is evidence for the latter view. Two stands in central Idaho occur at sites that were never grazed by livestock. They contain extensive near-monocultures of *Juncus balticus* and have significant hummocking created by freezing and thawing (Jankovsky-Jones 1999a). Observations in Montana and elsewhere indicate that *J. balticus* acts as an increaser and/or invader, occurring over a wide range of environmental conditions. It can increase after intensive grazing on sites occupied by *Carex nebrascensis, Deschampsia cespitosa, Calamagrostis canadensis,* and possibly other species because of its high tolerance of grazing. Once established *J. balticus* will maintain community dominance until site conditions are radically changed, either through a severe drop in water table depth or season-long flooding (Evenden 1989, Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995).

WILDLIFE FUNCTIONS

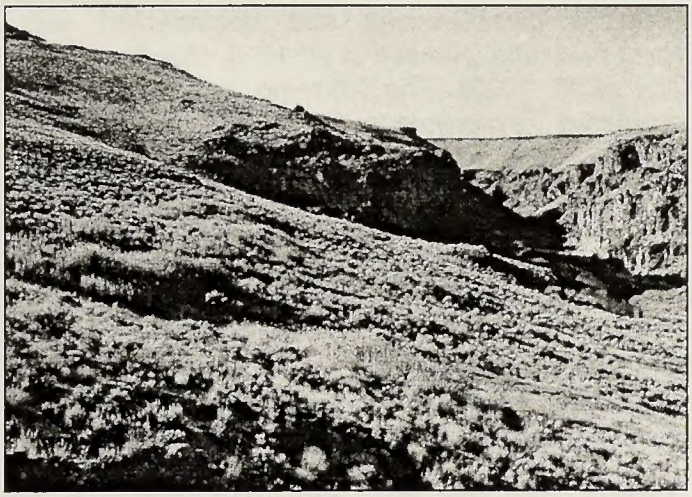
Juncus balticus stands provide important nesting, hiding, and feeding cover for shorebirds and waterfowl. Elk and deer will feed on plants especially early in the growing season (USDA 2000).

CLASSIFICATION COMMENTS

This plant association has been quantitatively defined and described by many studies throughout the western United States. In Idaho, Tuhy's (1981) *Juncus balticus-Muhlenbergia filiformis* plant association is included in this type.

Phragmites australis

Common reed **n=2**



RANGE

This plant association is known from throughout the west and northwest. It is documented from Montana (Hansen et al. 1995), Colorado (Kittel et al. 1999), Idaho (Huschle 1975, Hall and Hansen 1997), Utah, Oregon, and California (Anderson et al. 1998).

ENVIRONMENT

Stands of *Phragmites australis* are associated with both spring-fed and run-off dominated habitats at lower elevations. Along floodplains, *Phragmites* may occur on banks, in oxbows, in backwater areas, and in low swales. The association may also occur in contact with springs on canyon walls and hillsides. Disturbed areas such as irrigation canals, human made ponds, ditches, and railroad embankments may also support stands of this species (Hansen et al. 1995, Kittel et al. 1999). Most sites are classified as seasonally flooded, although it occurs around constant-flow springs in the canyons of southwestern Idaho. Elevations reported in Montana are from 2,100 to 3,850 feet, while in Idaho it occurs between 3,000 and 5,280 feet (Hansen et al. 1995, Hall and Hansen 1997, Jankovsky-Jones 1999).

SOILS

Soils are generally Entisols and Mollisols. Soil texture ranges from clay to silty or sandy loams. Sites often experience prolonged flooding, though water tables may fluctuate tremendously from at least 50 cm above to 1 m below the soil surface at the end of the growing season (Hansen et al. 1995, Hall and Hansen 1997).

VEGETATION COMPOSITION

Phragmites is a strongly rhizomatous perennial that generally forms tall (2 to 3 m), dense stands that appear as monocultures. Some stands may be quite extensive in size. Most stands have few associated species which generally occur in only trace amounts. Some exceptions include *Toxicodendron rydbergii*, which may form a continuous understory (Asherin and Claar 1976). *Agrostis stolonifera* and *Scirpus acutus* had high cover in a stand in eastern Idaho (Hall and Hansen 1997). Around undisturbed springs in southwestern Idaho *Aster hesperius* and *Angelica kingii* had relatively high cover (10% and 30%, respectively) (Moseley 1998).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Clematis ligusticifolia	50	0.5	0	1
FORBS				
Angelica kingii	50	5	0	10
Aster hesperius	50	15	0	30
Cirsium vulgare	50	0.5	0	1
Epilobium ciliatum	50	0.5	0	1
Galium aparine	50	0.5	0	1
Lactuca pulchella	50	0.5	0	1
Mentha arvensis	50	0.5	0	1
Mimulus guttatus	50	0.5	0	1
Rorippa nasturtium-aquaticum	50	0.5	0	1
Urtica dioica	50	1.5	0	3
FERNS/FERN ALLIES				
Equisetum arvense	50	0.5	0	1
GRAMINOIDS				
Phragmites australis	100	98	98	98
Elymus cinereus	50	0.5	0	1
Phalaris arundinacea	50	0.5	0	1

ADJACENT COMMUNITIES

Adjacent uplands in eastern Idaho include *Juniperus scopulorum* (Hall and Hansen 1997), while in the Owyhee canyonlands and Snake River Plain of southwestern Idaho it was *Artemisia tridentata* spp. *wyomingensis* associations. This association often borders open water and a number of riparian and wetland types, including *Scirpus acutus, Typha latifolia, Populus* spp. (cottonwoods), *Salix exigua,* other *Salix* spp, *Sarcobatus vermiculatus, Rhus trilobata, Betula occidentalis,* and various other herbaceous types (Hansen et al. 1995, Hall and Hansen 1997).

MANAGEMENT CONSIDERATIONS

Herbage production in the *Phragmites australis* association is high to very high. *Phragmites* is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. It is moderately tolerant of grazing. However, heavy grazing pressure may reduce the size and extent of stands. *Phragmites* produces good quality hay and silage. This plant association provides excellent streambank protection. Rhizomes hold and stabilize the bank while the stems and leaves help trap and filter sediments (Hansen et al. 1995, Hall and Hansen 1997).

SUCCESSIONAL DYNAMICS

Sites occupied by this plant asociation are typically so wet as to preclude most forms of disturbance or development. *Phragmites australis* is a strongly rhizomatous perennial that tends to outcompete all but the most disturbance-loving herbaceous species. However, with increased disturbance weedy species, such as *Cirsium arvense,* may invade. *Typha latifolia* and *Scirpus acutus* associations can occupy adjacent sites and appear to compete with one another, although the specific physical site requirements that allows one association to dominate over another are unknown (Hansen et al. 1995; Hall and Hansen 1997).

CLASSIFICATION COMMENTS

This plant association has been described in numerous classifications and documented with recent field data (Hansen et al. 1995, Moseley 1998, Kittel et al. 1999). The following associations are considered synonymous with the *Phragmites australis* plant association: *Phragmites australis/ Toxicodendron rydbergii* (Huschle 1975, Asherin and Claar 1976), and *Phragmites australis/Scirpus lacustris* (Johnston 1987). *Phragmites communis* is a synonym for *Phragmites australis.*

WILDLIFE FUNCTIONS

Phragmites australis is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. The 3 m height of *Phragmites* provides excellent thermal and hiding cover for large wildlife species. Waterfowl use this habitat for nesting and hiding cover. Other birds, such as red-winged and yellow-headed blackbirds are common inhabitants (Hansen et al. 1995, Hall and Hansen 1997). *Phragmites* is the larval host plant for a butterfly, the yuma skipper (*Ochlodes yuma*) (Ferris and Brown 1981).

Scirpus acutus (validus)

Hardstem bulrush

RANGE

Stands are known from Oregon, Washington, Nevada, California, Colorado, Idaho, North Dakota, South Dakota, and Montana.

ENVIRONMENT

Stands of this association occur along the margins of ponds, lakes, springs, and reservoirs, as stringers paralleling stream and river channels, or broad swaths in backwater marshes and sloughs. It is found at low to mid-elevations, from less than 2,000 feet to at least 6,600 feet. This type often inhabits relatively deep water, although the water level may be drawn down considerably through the growing season (Hansen et al. 1995, Hall and Hansen 1997).

SOILS

Soils are commonly Mollisols (Aquolls), Entisols (Aquents), or occasionally Histisols. The textures of surface horizons in long-lived stands are predominantly fines, which appear as black or gleyed, mucky clay or silty loam soils. Soils have high concentrations of decomposed and partially decomposed plant material that accumulate over time from annual dieback. Alluvial sands, gravels and cobbles may form an unconsolidated matrix in the subsurface horizons. Water tables are generally at or above the soil surface throughout the growing season. Soil reaction varies from neutral to moderately alkaline (pH 7.0 to 8.0) (Hansen et al. 1995, Hall and Hansen 1997).

VEGETATION COMPOSITION

The *Scirpus acutus* plant association usually appears as an impenetrable monotypic stand, often reaching 2 m or more in height. *Scirpus* spp. require high levels of moisture throughout the year. While stands may colonize saturated soils along streambanks or the periphery of ponds and reservoirs, they typically extend out into the water column to 2 m in depth. Due to the dense growth form and flooded water regimes, other species are largely absent, or if present, in limited amounts (Cole 1995, Hansen et al. 1995, Hall and Hansen 1997).

ADJACENT COMMUNITIES

Aquatic communities are present in adjacent open water habitat. On sites with similar soils and moisture regimes *Typha latifolia* stands may be present. A wide variety of wetland and riparian associations occupy adjacent drier sites. Adjacent uplands are also quite variable throughout the range of this association.

MANAGEMENT CONSIDERATIONS

Wet conditions and lack of palatable forage limit livestock use of this type. However, if upland forage becomes sparse and soil conditions dry, livestock may make use of *Scirpus acutus*. Soils are wet throughout the growing season and easily damaged from trampling by livestock and wildlife. Vegetation can also be damaged by trampling. This community will burn in either late fall or early spring if the water levels have dropped sufficiently (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Scirpus acutus occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian communities. These highly saturated conditions, coupled with an extremely dense growth form, allow this species to colonize sites at an early successional stage and maintain dominance as the climax vegetation. However, *Scirpus acutus* is regularly accompanied by other hydrophytes, such as *Sparganium emersum* and *Typha latifolia*. The reasons for the distribution of these species is difficult to discern, but minor changes in water chemistry or nutrient availability may favor the expansion of one species over another. Seasonal climatic changes may also play a role in determining which species dominate a site at a particular point in time (Hall and Hansen 1997). Cole (1995) discusses tentative successional relationships of *Scirpus acutus* types.

WILDLIFE FUNCTIONS

Scirpus acutus provides valuable nesting and roosting cover for a variety of songbirds and waterfowl, notably red-winged blackbirds, yellow-headed blackbirds, and marsh wrens. *Scirpus acutus* is a staple for muskrats and is used in construction of their huts. Seeds of *S. acutus* are eaten by a variety of birds. Waterfowl managers often attempt to increase the proportion of *S. acutus* relative to *Typha latifolia* as a means of improving habitat (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

Hansen et al. (1995) and Hall and Hansen (1997) have a *Scirpus acutus* habitat type in their classifications that includes all combinations of *Scirpus acutus* and *S. validus* (=*S. tabernaemontani*)

due to similarities in environmental conditions and management concerns. *Scirpus validus* is often treated as a separate alliance in the Western Regional Vegetation Classification (Reid et al. 2000). Characteristics that separate the two species are quite subtle and the two species will hybridize. We are inclined to include stands of *Scirpus validus* in the *Scirpus acutus* association for these reasons. Cole (1995) described four associations with *S. acutus* as the dominant species: *S. acutus-Veronica anagallis-aquatica, S. acutus-Lemna* sp., *S. acutus-Lemna* sp.-*Solanum dulcamara,* and *S. acutus-Typha latifolia.* The *Scirpus acutus* type described here encompasses enough compositional and structural variation to include Cole's types.

Scirpus americanus

Threesquare bulrush **n=1**

RANGE

Scirpus americanus is widely distributed throughout North and South America. The *Scirpus americanus* plant association occurs in Idaho, Colorado, Utah, Montana, and Oregon. It is widely scattered throughout the lower elevations of southwest Idaho.

ENVIRONMENT

Scirpus americanus occurs around lakes and springs, as well as in subirrigated marshes and wet meadows. The plant is tolerant of alkaline conditions.

SOILS

Soils are variable, ranging from relatively deep and organic, to alkaline and calcareous clay soils, to coarse mineral soils that are directly in contact with thermal waters.

VEGETATION COMPOSITION

The *Scirpus americanus* plant association may occur in alkaline habitats or in association with hot springs. *Scirpus americanus* clearly dominates with 50 to nearly 100% cover. Stems of *Scirpus americanus* can reach over 3 m tall. Low species diversity is characteristic. Minor amounts of *Eleocharis palustris, Carex nebrascensis, Carex utriculata,* and *Aster frondosus* are present in alkaline situations. Where the type occurs in association with hot springs, *Eleocharis palustris* is frequently replaced by *Eleocharis rostellata.* It was also noted that the forbs *Helianthus nuttallii* and *Epilobium ciliatum* were present in association with the type at hot springs.

ADJACENT COMMUNITIES

Adjacent associations may be dominated by *Carex* spp., *Eleocharis* spp. (*E. palustris* or *E. rostellata*), *Pentaphylloides floribunda, Deschampsia cespitosa,* or *Distichlis spicata* var. *stricta.* This type often occurs in the sagebrush-steppe zone.

MANAGEMENT CONSIDERATIONS

Trampling damage of the wet, organic soils of this association readily occurs with any livestock utilization. Livestock may graze plants in this association, and overgrazing can cause compositional changes to species of lower palatability. *Scirpus americanus* may have potential for restoration of wetlands as it is a prolific seed producer and it is fairly drought tolerant once established. Dense stands function to filter sediments and stabilize soils of lake margins and stream banks (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Scirpus americanus is an early colonizer and able to persist under drought conditions. Due to the rhizomatous nature of the species, few other species become established. Stands in Utah are reported as climax with little competition from other species (USDA 2000).

SPECIES	CON	COVER	MIN	MAX
FORBS				
Castilleja exilis	100	1	1	1
Cicuta maculata	100	3	3	3
Epilobium ciliatum	100	1	1	1
GRAMINOIDS				
Agrostis stolonifera	100	1	1	1
Eleocharis rostellata	100	1	1	1
Phalaris arundinacea	100	1	1	1
Polypogon monspeliensis	100	1	1	1
Scirpus americanus	100	98	98	98

WILDLIFE FUNCTIONS

Scirpus species are used by muskrats for building huts and some waterfowl for constructing nests. Waterfowl may use these areas for nesting and hiding cover. Other birds such as red-winged blackbirds and yellow-headed blackbirds are common (Hansen et al. 1995). Rhizomes of *Scirpus americanus* provide food for muskrat and geese. In fact, "eat outs" are reported where populations of muskrat and geese are so high that all the rhizomes and rootstocks are consumed and stands are eliminated (USDA 2000).

CLASSIFICATION COMMENTS

In Montana, Hansen et al. (1995) lumped all combinations of *Scirpus americanus* and *S. pungens* into a *S. pungens* habitat type due to similarities in environmental conditions and management concerns. Likewise, Kittel et al. (1999) considered the two species synonymous. There are taxonomic issues between *Scirpus americanus, Scirpus pungens,* and *Scirpus olneyi* that need to be understood before description of these plant associations can be fully developed. Kartesz (1994) considers *S. pungens* and *S. olneyi* synonymous with *S. americanus.* However, for the Flora of North America project *Scirpus olneyi* and *S. americanus* are considered synonyms and *S. pungens* is treated as a distinct species (Hurd pers. comm. 2000).

Scirpus pungens

Leafy bulrush **n=3**

RANGE

Scirpus pungens is common and widespread in the United States. This association has been described from Utah, Wyoming, Idaho, Montana, western North Dakota, and western Nebraska.

ENVIRONMENT

Stands of this association are found along low-gradient, meandering, usually perennial streams. It is also found around the margins of ponds and marshes (Hansen et al. 1995, Jones and Walford 1995, Walford 1996, Moseley 1998). Along streams, this type helps to filter out sediments and build streambanks (Hansen et al. 1985).

SOILS

Stands of this association have been sampled on Fluvaquents and Haplaquolls in Montana (Hansen et al. 1995). Textures of the upper soil horizons may be clay, clay loam, and sandy loam (Hansen et al. 1995, Jones and Walford 1995, Walford 1996). Loamy sand has been found deep in the soil profile (Walford 1996).

VEGETATION COMPOSITION

Scirpus pungens dominates the herbaceous vegetation layer, which is 20 to 40 cm tall; other species that often are present are *Spartina gracilis, Hordeum jubatum, Agropyron smithii,* and *Eleocharis palustris.* Stands of this association contain no tree or shrub layer, but a few scattered trees and shrubs may be present, most commonly of *Populus deltoides, Salix amygdaloides, Salix exigua, Salix lutea,* or *Symphoricarpos occidentalis.* These woody species are often present as sprouts.

ADJACENT COMMUNITIES

Adjacent wetter sites often support stands of *Eleocharis palustris, Typha latifolia,* or *Scirpus acutus* herbaceous vegetation types. Adjacent drier riparian sites often support stands of *Spartina pectinata, Spartina gracilis, Distichlis spicata,* or *Agropyron smithii* herbaceous vegetation types. In southwestern Idaho, this community is often adjacent to *Salix exigua* communities.

MANAGEMENT CONSIDERATIONS

Stands of this association produce abundant herbage, but most of the species are relatively unpalatable to livestock; so use is light unless little other forage is available. The vegetation provides nesting and hiding cover for waterfowl and songbirds, and food for a variety of animal species. Warm-water fish may use inundated stands as spawning beds. The strong rhizomes of *Scirpus pungens* provide moderate protection to streambanks from erosion (Hansen et al. 1995).

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Salix exigua	100	1.0	1	1
Salix lasiandra var. caudata	67	0.7	0	1
Salix lutea	100	1.0	1	1
FORBS				
Euthamia occidentalis	67	0.7	0	1
Mentha arvensis	67	0.7	0	1
Plantago major	67	0.7	0	1
Potentilla anserina	67	1.3	0	3
Ranunculus cymbalaria	67	0.7	0	1
Xanthium strumarium	67	0.7	0	1
FERNS/FERN ALLIES				
Equisetum laevigatum	67	0.7	0	1
GRAMINOIDS				
Carex lanuginosa	67	10.3	0	30
Eleocharis palustris	100	13.7	1	20
Phalaris arundinacea	67	0.7	0	1
Scirpus pungens	100	76.7	60	90

SUCCESSIONAL DYNAMICS

Scirpus pungens becomes established on wet, bare sediments and often comes to dominate such sites quickly (Hansen et al. 1995). It occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian species. These highly saturated conditions, coupled with an extremely dense rhizomatous growth form, allow this

aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation (Hall and Hansen 1997).

WILDLIFE FUNCTIONS

This type is an important source of shade, hiding cover, and food for wildlife. It is used by muskrats for construction of huts. Waterfowl use this type for nesting and hiding cover. Warm water fish may make use of this type as spawning beds.

CLASSIFICATION COMMENTS

In Montana, Hansen et al. (1995) lumped all combinations of *Scirpus americanus* and *S. pungens* into a *S. pungens* habitat type due to similarities in environmental conditions and management concerns. Likewise, Kittel et al. (1999) considered the two species synonymous. There are taxonomic issues between *S. americanus, S. pungens,* and *Scirpus olneyi* that need to be understood before description of these plant associations can be fully developed. Kartesz (1994) considers *S. pungens* and *S. olneyi* synonymous with *S. americanus.* However, for the Flora of North America project, *Scirpus olneyi* and *S. americanus* are considered synonyms and *S. pungens* is treated as a distinct species (Hurd pers. comm. 2000). The two species are generally mutually exclusive and, from a biodiversity conservation standpoint, two associations should be recognized.

Sporobolus airoides

Alkali sacaton

RANGE

This plant association is known to occur in the Great Plains, Great Basin, and in southwestern deserts. It is reported in California, Colorado, Kansas, Montana, New Mexico, and Texas (Reid et al 2000). It has been observed and sampled in Idaho as well.

ENVIRONMENT

This association occurs in intermittent drainageways, terraces, swales, basins, and alluvial flats at lower elevations. Sites usually have a somewhat high water table due to landscape position and impermeable subsurface material (Reid et al. 1999).

SOILS

Soils may be non-saline but are usually moderately saline to alkaline sands or clays.

VEGETATION COMPOSITION

The graminoid, *Sporobolus airoides,* is clearly the dominant plant species and may be present as a monoculture. Associated species reported in Idaho include *Agropyron smithii, Poa nevadensis,* and *Distichlis spicata* (Jankovsky-Jones et al. 2000). Common associates reported from Great Plains states include *Buchloe dactyloides, Bouteloua gracilis, Schizachyrium scoparium, Hordeum pusillum,* and *Sporobolus cryptandrus* (Kittel et al. 1999, Reid et al. 1999). Widely scattered shrubs such as *Allenrolfea occidentalis, Atriplex canescens, Chrysothamnus* spp., and *Sarcobatus vermiculatus* may also be present.

ADJACENT COMMUNITIES

Adjacent vegetation is variable. Wetland plant associations may include *Scirpus acutus* and *Juncus balticus*. Along floodplains stands of *Populus* spp. or *Salix* spp. may be adjacent. In both Idaho plots, uplands are *Artemisia tridentata* ssp. *wyomingensis/Stipa comata*. In the Great Plains upland grasslands or shrublands with *Bouteloua, Atriplex,* and *Sarcobatus* or *Pinus edulis-Juniperus* spp. woodlands are reported (Jankovsky-Jones et al. 2000, Reid et al. 1999).

MANAGEMENT CONSIDERATIONS

Palatability of *Sporobolus airoides* is highest early in the growing season before plants become coarse. It is less palatable than *Agropyron* spp. that may be growing nearby. Cattle graze this species in the winter and sheep may use it heavily if other browse is not available (USDA 2000). With heavy grazing, cover of *Distichlis spicata* is reported to increase. The diagnostic graminoid is commonly used for reseeding disturbed landscapes such as mine sites and has been used for restoring riparian sites. Seedling establishment requires extra irrigation, but once plants are established little maintenance is required (USDA 2000).

SUCCESSIONAL DYNAMICS

The *Sporobolus airoides* plant association is considered early-seral. The association occurs on areas of the floodplain that are infrequently flooded and areas with high water tables because of landscape position (Kittel et al. 1999). Cover of *Sporobolus airoides* may be decreased as increases in salinity make room for other species such as *Distichlis spicata*. If salinity is not changed, hummocks will form that collect sand. Eventually other grasses will become established in response to decreased salinity and moisture.

WILDLIFE FUNCTIONS

Sporobolus airoides is rated as poor to fair browse for big game, birds, and waterfowl. It is listed as fair to good browse for small mammals (USDA 2000).

CLASSIFICATION COMMENTS

Several plant associations with *Sporobolus airoides* as the diagnostic species have been described for the western United States. Further classification work is probably needed to fully clarify the attributes that distinguish this plant association from other associations that have high cover of *Sporobolus airoides*.

MISCELLANEOUS GRAMINOID PLANT ASSOCIATIONS

Alopecurus sp. vernal pool

Foxtail vernal pool

(2 community observations)

Two internally drained vernal pools dominated by a species of *Alopecurus* (first misidentified as *Alopecurus geniculatus* but actually an annual species, most likely *Alopecurus carolinianus*) were anecdotally observed near the Idaho-Nevada border on the Owyhee Plateau (Moseley 1999, Rust et al. 2000). One vernal pool, dry by late June (after a wet spring), was located on a bench within the South Fork Owyhee River Canyon (less than 1 mi south of the 45 Ranch Allotment boundary) (Moseley 1999). This site was rarely grazed and in good condition. Another vernal pool, located on the Owyhee Plateau at "Idaho Lake" (5,990 feet elevation), is just over 1 mile north of the Idaho-Nevada border on Columbet Table (Rust et al. 2000). This site was heavily grazed and trampled. Vegetative diversity and total cover was low. *Alopecurus* dominated though inclusions of small swales holding water longer into the summer were present and dominated by *Eleocharis palustris* (Rust et al. 2000). The most common forbs were *Plagiobothrys scouleri* and *Psilocarphus brevissimus*, typical vernal pool annuals. The only other forbs noted were *Epilobium* spp. and *Myosurus minimus*. Vernally wet playas dominated by *Agropyron smithii*, with *Alopecurus carolinianus*, *Eleocharis palustris*, *Limosella aquatica*, *Myosurus minimus*, *Plagiobothrys scouleri*, and *Veronica peregrina*, are known from the south and central Great Plains (Witham et al. 1996, Langendoen 1999?). Another annual *Alopecurus* species, *Alopecurus saccatus*, is a component of vernal pool vegetation in California (Zedler 1987), Oregon, and Washington. The exotic perennial species *Alopecurus geniculatus* was present in vernal pools studied on the basaltic Columbia Plateau of eastern Washington (Crowe et al. 1994). Other than for *Lepidium davisii* playas and *Eleocharis palustris* vernal pools, information regarding vernal pool plant associations in southwest Idaho is scant. Much more intensive sampling of this plant association and other vernal pool types should occur.

Carex douglasii

Douglas' sedge

(1 community observation)

One stand dominated by *Carex douglasii* was observed in an old flood channel swale on an island in the lower Payette River (Birding Islands) (Jankovsky-Jones et al. 2000). The soil was a well-drained and sandy silt loam and the site floods only in the most extreme peak flows. *Carex douglasii* dominated the stand (70% cover), though annual *Bromus* spp. (e.g., *Bromus tectorum* with 10% cover), *Carex praegracilis*, and *Elymus triticoides* were also common. A few *Salix exigua* shoots were observed but the site is too dry to support *Salix exigua* vegetation. Two forb species, *Geranium carolinianum* and *Equisetum laevigatum* were widespread and common (about 10% cover each), while other forbs, such as *Achillea millefolium*, *Artemisia ludoviciana*, *Asclepias speciosa*, *Conyza canadensis*, *Glycyrrhiza lepidota*, *Helianthus annuus*, *Rumex crispus*, and *Solidago gigantea*, were present in lesser amounts. Overall, the stand was relatively weedy reflecting historical livestock grazing. The observed *Carex douglasii* stand appeared stable (no sign of shrub invasion). However, the *Carex douglasii* plant association is considered a grazing induced type in Nevada (Manning and Padgett 1995, Weixelman et al. 1996). It may be successionally related to the *Artemisia tridentata* ssp. *tridentata*/*Carex douglasii* or *Artemisia tridentata* ssp. *tridentata*/*Elymus cinereus* plant associations, or other graminoid types such as the *Carex praegracilis* or *Elymus triticoides* plant associations (Jankovsky-Jones et al. 2000).

Carex sheldonii

Sheldon's sedge

(1 plot)

The *Carex sheldonii* plant association was encountered in southwest Idaho only at The Tules on the East Fork of the Owyhee River, where it occupied a zone between *Scirpus acutus* and uplands (Moseley 1998). It is also habitat for the rare species, *Teucrium canadense*. *Carex sheldonii* had nearly 100% cover in the stand, with only a few *Salix exigua* and *Rosa woodsii* sprouts present. A relatively high diversity of forbs, including *Artemisia ludoviciana*, *Aster ascendens*, *Mentha arvense*, and *Polygonum amphibium*, occurred with low cover. *Agrostis scabra* and *Hordeum brachyantherum* were the only other graminoids present. The *Carex sheldonii* plant association has also been sampled in the Blue Mountains of eastern Oregon (Crowe and Clausnitzer 1997, Oregon Natural Heritage Program 1999). In Idaho, the species occurs only in the southwestern part of the state from southern Hells Canyon (including Summer Creek), south to at least

The Tules (Moseley 1998). It has been documented from one draingage on the Andrus Wildlife Management Area in Hells Canyon, where it dominated small patches (Moseley 1998). A small patch of *Carex sheldonii* has also been observed on a sandy alluvial terrace along the Boise River in a *Populus trichocarpa* gap (Jankovsky-Jones et al. 2000). Another small patch was observed at Grasmere, on the Owyhee Plateau, in a swale on the fringe of a *Salix exigua/Rosa woodsii* riparian zone (Rust et al. 2000). No other large stands have been documented in Idaho.

Carex vulpinoidea

Fox sedge

(1 community observation)

The tentatively classified *Carex vulpinoidea* plant association was observed on the lower Payette River (at Montour) (Jankovsky-Jones et al. 2000). It is also known from reservoirs on the Snake River in southern Hells Canyon, the Boise River, and at Dworshak Reservoir on the North Fork Clearwater River in north-central Idaho (Lichthardt et al. 2000). It has not been formerly described and more plot data is needed on this type. In southwest Idaho, *Carex vulpinoidea* is commonly found on low elevation river banks, alluvial point bars, and terraces (e.g., about 2500 feet elevation or less on the lower Boise, Payette, and Snake Rivers), but is also found in ephemerally wet meadows and swales in the floodplain (Jankovsky-Jones et al. 2000). It is tolerant of long periods of flooding and occasionally colonizes bare soil near the high water lines of reservoirs (Lichthardt et al. 2000). The stand observed on the Payette River was in a subirrigated swale/ditch behind a slightly higher alluvial bar (with *Populus trichocarpa*) along the river (Jankovsky-Jones et al. 2000). The soil was sandy silt loam of alluvial origin (the site is flooded by the river only during very high peak flows). *Carex vulpinoidea* dominated the swale with 65% cover, though *Agropyron repens, Juncus balticus*, and *Leersia oryzoides* were also common with 5 to 10% cover each (Jankovsky-Jones et al. 2000). Other common mesic graminoids, with 1 to 3% cover, were *Agrostis stolonifera, Carex lanuginosa, C. praegracilis, Juncus ensifolius, J. tenuis, Phalaris arundinacea, Poa pratensis*, and *Scirpus americanus*. The only forbs of importance were *Polygonum hydropiper* (5 to 10%) and *Lycopus americanus*. *The Carex vulpinoidea* stands on Dworshak Reservoir were similarly dominated by *Carex vulpinoidea* with *Polygonum hydropiper* also important (Lichthardt et al. 2000). *Equisetum arvense, Juncus balticus, Plantago major,* and *Rorippa islandica* were also common.

Elymus triticoides

Beardless wildrye

(1 plot and 1 community observation)

Two occurrences of the tentatively classified *Elymus triticoides* plant association were documented in southwest Idaho, though it was not sampled at any reference areas (Jankovsky-Jones et al. 2000). One plot was sampled on an island at Three Island Crossing on the Snake River at Glenns Ferry. The community was also observed on islands and terraces of the lower Payette River (at Birding Islands). Though not formerly described, the *Elymus triticoides* plant association is known from Nevada (Manning and Padgett 1995) and elsewhere on the Snake River Plain of southern Idaho (e.g., above American Falls Reservoir) (Jankovsky-Jones et al. 2000). Very similar communities, the *Elymus triticoides-Carex* spp. and *Elymus triticoides-Poa secunda* associations, are known from Nevada and northeastern California (Reid et al. 2000). In southwest Idaho, the *Elymus triticoides* plant association is found on well-drained sandy silt loam soil of alluvial origin that may be ephemerally moist and slightly alkaline (Jankovsky-Jones et al. 2000). It is found in swales, often formed by ancient flood channels, on islands, floodplains, and terraces that are flooded only in extreme runoff events. *Elymus triticoides* forms dense swards with 80 to 90% cover with a high diversity of herbs intermixed. The most commonly observed graminoid species, all with trace cover, are *Agropyron smithii, A. elongatum*, annual *Bromus* spp., *Carex douglasii, C. praegracilis, Distichlis spicata, Elymus cinereus*, and *Sporobolus airoides* (Jankovsky-Jones et al. 2000). The forb species were generally weedy but none had more than trace cover. The most commonly observed forbs were *Achillea millefolium, Asclepias speciosa, Artemisia ludoviciana, Atriplex* spp., *Cirsium arvense, Conium maculatum, Conyza canadensis, Dipsacus sylvestris, Helianthus annuus, Lepidium latifolium, Rumex crispus*, and *Solidago gigantea* (Jankovsky-Jones et al. 2000). The *Elymus triticoides* plant association is found in a mosaic with several other related plant communities including those dominated *by Agropyron smithii, Artemisia tridentata* ssp. *tridentata, Carex douglasii, C. praegracilis, Sarcobatus vermiculatus/Distichlis spicata*, and *Sporobolus airoides*.

Juncus effusus

Common rush

(1 community observation)

The *Juncus effusus* plant association was observed in wet pastures on the floodplain of the lower Payette River at Montour (Jankovsky-Jones et al. 2000). Small patches dominated by *Juncus effusus* were also anecdotally noted on the lower Boise River (e.g., Barber Park area and Eagle Island State Park). In Idaho, the *Juncus effusus* plant association is also known from the panhandle of northern Idaho (Jankovsky-Jones 1997b). The *Juncus effusus* association observed on the Payette River floodplain was dominated by *Juncus effusus* with about 70% cover, though *Carex vulpinoidea* was common with up to 20% cover (Jankovsky-Jones et al. 2000). *Agrostis stolonifera, Carex lanuginosa, Glyceria grandis*, and *Phalaris arundinacea* were all noticeable with 1 to 5% cover each. *Polygonum hydropiper* and *Myosotis laxa* were both abundant with up to 15% cover each. *Epilobium ciliatum, Lemna minor*, and *Veronica americana* were also noticeable with 3 to 8% cover each. In contrast, a *Juncus effusus* stand sampled from a meadow in northern Idaho had moderate cover of *Agrostis stolonifera, Carex bebbii*, and *Glyceria elata* but no forbs of significance (Jankovsky-Jones 1997). The range of *Juncus effusus* is widespread and it forms communities in coastal tideland marshes, in seasonally flooded pastures, and on the edges of ponds, lakes, and rivers (Elzinga and Rosentreter 1999). Though preferring moist soils in the growing season, *Juncus effusus* is not tolerant of summer flooding. Soils are typically fine-textured or loamy, though stands on the Payette River had significant amounts of organic matter intermixed (Jankovsky-Jones et al. 2000). Elzinga and Rosentreter (1999) note that *Juncus effusus* is rarely found in large stands or as a dominant but increases with grazing. The stands of *Juncus effusus* observed at Montour and Eagle Island are found in cattle pastures that are periodically flooded by both sub-irrigation and surface flows from irrigation ditches (but not often flooded by rivers). At these sites, *Juncus effusus* forms patch mosaics or mixed mesic graminoid meadows with *Agrostis stolonifera, Carex* spp. (*Carex lanuginosa, C. utriculata, C. vulpinoidea*), annual *Eleocharis* spp., *Eleocharis palustris, Glyceria borealis, Juncus balticus, Lythrum salicaria, Scirpus* spp. (*Scirpus microcarpus, S. pallidus, S. validus* or *acutus*), and *Typha latifolia* (Jankovsky-Jones et al. 2000). Its dominance over other mesic graminoid species may be grazing induced.

Muhlenbergia richardsonis

Mat muhly

(4 community observations)

On the Owyhee Plateau and Snake River Plain of southwest Idaho, ephemeral drainages and vernal pool-like depressions dominated by *Muhlenbergia richardsonis* were observed (Rust et al. 2000). No plots were sampled in reference areas. The *Muhlenbergia richardsonis* plant association has not been formerly described, though it is known from eastern Idaho (Jankovsky-Jones 1997c, 1999a) and Nevada (Weixelman et al. 1996). In Idaho, however, it had not previously been recorded in ephemeral drainages or vernal pool-like depressions. In the high elevation basin valleys of east-central and southeast Idaho, *Muhlenbergia richardsonis* dominates shallow, sandy or silty alkaline soil of alluvial benches and meadows (Jankovsky-Jones 1997c, 1999a). *Muhlenbergia richardsonis* is relatively widespread and common in southwest Idaho, associated with, for example, *Artemisia cana* ringing *Eleocharis palustris* vernal lakes or with Artemisia ludoviciana in ephemeral drainages (Moseley 1998, 1999, Rust et al. 2000). It is also sometimes abundant in other related associations such as the *Carex douglasii, Juncus balticus*, and *Poa cusickii* (Kovalchik 1987, Manning and Padgett 1995). Its dominance of large areas, however, appears infrequent. However, *Muhlenbergia richardsonis* often increases, relative to other grasses, under heavy grazing (USDA 2000). More plot samples of *Muhlenbergia richardsonis* dominated stands are needed to solidify the classification of this type.

Two ephemeral drainages dominated by *Muhlenbergia richardsonis* were observed, one on the Snake River Birds of Prey National Conservation Area in Canyon Creek (3,125 feet elevation) and another on the Owyhee Plateau near Grasmere (Rust et al. 2000). Both drainages eroded the surface of basaltic plateaus and were extremely rocky. The drainages carry spring snowmelt and rainstorm runoff. Soils were thin and gravelly coarse sand, deposited in the rock inter-spaces. *Muhlenbergia richardsonis* formed patchy mats with 25 to 50% total cover. Wet depressions held *Eleocharis palustris* while other areas supported inclusions dominated by *Bromus tectorum, Carex douglasii, Danthonia californica, Deschampsia danthonioides*, annual *Eleocharis* spp., *Juncus balticus*, and/or *Poa nevadensis* (Rust et al. 2000). *Artemisia ludoviciana* and *Iva axillaris* were the most common forbs (with low cover), though *Haplopappus uniflorus, Iris missouriensis, Navarretia intertexta*, and *Trifolium* spp. were also observed. Weedy species, such as *Ranunculus testiculatus*, were common in disturbed areas. Two other stands of the

Muhlenbergia richardsonis plant association were observed in internally drained vernal pool-like basins near Grasmere (south of Buster Butte) at 5,100 feet elevation (Rust et al. 2000). These depressions had what appeared to be ash derived soils (rich in sand, silt, and clay) that cracked upon drying. *Muhlenbergia richardsonis*, with 15 to 20% cover, dominated the lowest areas of the depressions where soils were vernally wet (or occasionally flooded) from snow melt and rainfall runoff. At a slightly higher and drier elevation in the depression, *Sitanion hystrix* formed a poorly defined border around the *Muhlenbergia richardsonis*. Miscellaneous weedy forbs typical of drier soils (especially *Iva axillaris* but also including *Brassica* sp., *Descurainia sophia, Lepidium perfoliatum, Mentzelia albicaulis, Microsteris gracilis*, and *Thlaspi arvense*) were scattered throughout the depressions on bare soil disturbed by cattle grazing. *Agropyron smithii and Poa secunda* were occasionally observed on drier soils. Similar depressions dominated *by Sitanion hystrix* (or occasionally *Atriplex nuttalii/Sitanion hystrix*) have been observed on the Owyhee Plateau but do not hold enough moisture to support *Muhlenbergia richardsonis* or vernal pool species (Rust et al. 2000).

Paspalum distichum

Knotgrass

(1 community observation)

The *Paspalum distichum* plant association was observed once in the Snake River canyon (at Halverson Lake springs) within the Snake River Birds of Prey National Conservation Area (Jankovsky-Jones et al. 2000). In southwest Idaho, *Paspalum distichum* is occasionally observed with other mesic herbs at low elevations along river and streambanks, reservoir shorelines, and lakes or ponds. Communities dominated by *Paspalum distichum*, however, are rarely observed. The *Paspalum distichum* plant association is more common on the floodplain of the lower Columbia River below Longview, Washington where it has been described (Kunze 1994). The association is also known from the lower Snake River (e.g., near Weiser) and Hells Canyon in Idaho. The stand observed at Halverson Lake springs was found on an ancient high bar of the Snake River but was not adjacent to the river channel. It occupied a low-lying swale adjacent to a spring-fed pond that completely dried by mid-summer (though the site appeared sub-irrigated by nearby spring channels). The springs were mostly fed by irrigation return flow generated from adjacent farms. The soil was a moist (though moisture fluctuates), organically rich, loam at the surface (with a pH of 7.3) that overlaid sand. *Paspalum distichum* formed dense swards (50% cover) in mosaic with patches of *Eleocharis palustris* (5% cover) and *Xanthium strumarium* (up to 40% cover) (Jankovsky-Jones et al. 2000). Other mesic graminoid species were *Echinochloa crus-galli* and *Scirpus* spp. (*Scirpus acutus, S. americanus, S. glaucus*, and *S. maritimus*). Forb species common in the adjacent spring channel each had 5% cover (e.g., *Berula erecta, Euthamia occidentalis, Veronica anagallis-aquatica*). Other weedy forbs were also moderately abundant, such as *Bidens frondosa* and *Polygonum lapathifolium*.

Poa nevadensis

Nevada Bluegrass

(3 community observations)

Several degraded stands of what were most likely the *Poa nevadensis* plant association were observed on the Owyhee Plateau (Rust et al. 2000). Stands were noted throughout the Owyhee Plateau in "tableland and basin" topography, typically between 5,800 and 6,000 feet in elevation. Stands were formerly documented near Riddle and at the Big Springs Butte Basin reference site (no plot data). Two stands were co-dominated by *Wyethia amplexicaulis* and one co-dominated by *Juncus balticus* (Rust et al. 2000). The *Poa nevadensis* plant association occupies broad ephemerally wet seeps on north to east facing, gently sloping benches and toe-slopes. These sites have relatively shallow clay and silt loam soil that dries very hard by mid-summer and appear perched over volcanic bedrock. Sites are below steeper sagebrush, aspen, or mountain shrub dominated colluvial slopes where snowdrifts form in the lee of basaltic tableland rimrock. Manning and Padgett (1995) described the *Poa nevadensis* plant association from various environmental settings in Nevada. Other similar and related plant associations include those dominated by *Danthonia californica, Hordeum brachyantherum, Juncus balticus*, and *Muhlenbergia richardsonis* (e.g., Manning and Padgett 1995, Weixelman et al. 1996, Moseley 1999, Rust et al. 2000). For example, slightly drier sites dominated by *Poa nevadensis*, with less *Hordeum brachyantherum*, are classified as the *Poa nevadensis* plant association. However, slightly moister sites co-dominated by *Poa nevadensis* and *Hordeum brachyantherum* are classified as the *Hordeum brachyantherum* plant association (Manning and Padgett 1995). While *Poa nevadensis* can replace *Hordeum brachyantherum* as sites become drier (e.g., due to soil compaction

from overgrazing), *Poa nevadensis* can be replaced by grazing tolerant species under heavy livestock use (Manning and Padgett 1995). In stands observed on the Owyhee Plateau, grazing tolerant, unpalatable, or weedy species were common, such as *Wyethia amplexicaulis, Juncus balticus, Agrostis interrupta, Bromus japonicus, Phleum pratense, Poa bulbosa*, and *Poa pratensis* (Manning and Padgett 1995, Weixelman et al. 1996, Rust et al. 2000). High cover or dominance by *Wyethia amplexicaulis* (especially on clay soils), and sometimes *Juncus balticus*, is indicative of heavy grazing and these plants' ability to monopolize moisture and out-compete *Poa nevadensis* or other mesic graminoid species (Manning and Padgett 1995, USDA 2000). Once established, *Wyethia amplexicaulis* can persist for long periods of time.

The *Poa nevadensis* plant association observed on the Owyhee Plateau had 30 to 50% cover of *Poa nevadensis*. Two stands were dominated by *Wyethia amplexicaulis* with 50 to 70% cover while another had high cover of *Juncus balticus* and trace *Wyethia amplexicaulis* (Rust et al. 2000). A diverse mixture of mesic, vernally wet, and dry site graminoid species were commonly associated, many with moderate cover. These included, in order of importance, annual *Eleocharis* spp. (e.g., *Eleocharis bolanderi*), *Deschampsia danthonioides, Juncus tenuis, Hordeum brachyantherum, Muhlenbergia richardsonis, Agropyron smithii, A. trachycaulum, Poa pratensis, P. bulbosa, Koelaria cristata, Festuca idahoensis*, and *Danthonia californica* (Rust et al. 2000). Numerous perennial forb species (other than *Wyethia amplexicaulis*) were present, some with moderate cover. They included, in order of importance, *Arnica fulgens, Senecio integerrimus, Camassia quamash, Aster* spp., *Iris missouriensis, Achillea millefolium, Penstemon* spp., *Delphinium* spp., *Perideridia bolanderi, Artemisia ludoviciana, Antennaria* spp., *Haplopappus lanceolatus, Potentilla gracilis*, and *Cirsium scariosum*. Various annual forb species, common in vernally wet areas, were present, including *Madia gracilis, Navarretia intertexta, Orthocarpus luteus*, and *Polygonum confertiflorum* (Rust et al. 2000).

Poa pratensis (palustris)

Kentucky bluegrass (Fowl bluegrass)

(2 community observations)

Two degraded sites dominated by exotic, weedy *Poa* species were documented on the Owyhee Plateau (Rust et al. 2000). One heavily grazed ephemerally wet meadow at Moorcastle Springs near Riddle was dominated by *Poa pratensis* while sloughing banks along Shoofly Creek in Duck Valley were dominated by *Poa palustris*. Riparian zones, springs, and wet meadows dominated by exotic mesic graminoid species, such as *Agrostis stolonifera, Bromus inermis, Phleum pratense, Poa palustris*, and *Poa pratensis*, are relatively common in heavily grazed areas and near ranches in southwest Idaho. They were not usually sampled at reference areas or other sites during this field research that focused mainly on natural stands of vegetation (Moseley 1998, 1999). Grazing disclimax communities dominated by *Poa pratensis* are widely documented throughout the intermountain west and elsewhere (e.g., Youngblood et al. 1985, Kovalchik 1987, Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997, and others). In the majority of these *Poa pratensis* communities, including the Owyhee stand, *Juncus balticus* was also a common to abundant associate. The Owyhee stand, located in a spring-fed meadow that dried by late summer, had many other species typical of grazed *Poa pratensis* communities. These species included (in order of importance) *Taraxacum officinale, Iris missouriensis, Aster* spp., *Carex nebrascensis, Cirsium scariosum, Achillea millefolium*, and *Potentilla gracilis* (e.g., Youngblood et al. 1985, Padgett et al. 1989, Kovalchik 1987, Manning and Padgett 1995, Rust et al. 2000). *Hordeum brachyantherum, Muhlenbergia richardsonis*, and *Carex douglasii* were also present, as well as vernal species including *Camissonia tanacetifolia, Deschampsia danthonioides, Navarretia intertexta*, and *Plagiobothrys scouleri* (Rust et al. 2000). The site potential was probably a mosaic of *Carex nebrascensis* on moister soil and *Juncus balticus* on slightly drier soil. The *Poa palustris* plant association is also widespread and well documented but less common than the *Poa pratensis* association (e.g., Youngblood et al. 1985, Hansen et al. 1995). *Poa palustris* typically occupies wetter sites than *Poa pratensis* and is probably a pioneering species on highly disturbed soil. Such is the case with the *Poa palustris* plant association observed in Duck Valley. *Poa palustris* colonized wet sandy alluvial point bars, islands, and streambanks at or below the high water line of Shoofly Creek, forming a patchy mosaic with *Eleocharis palustris* and *Carex nebrascensis* (Rust et al. 2000). A long history of cattle grazing has removed woody vegetation and caused over-widening and downcutting of the creek resulting in bank sloughing and much exposed soil.

Scirpus microcarpus

Small-fruit bulrush

(1 community observation)

The *Scirpus microcarpus* plant association was observed once on the Boise River at Eagle Island State Park (Jankovsky-Jones et al. 2000). It was not sampled at any reference area and may be rare in southwest Idaho. In Idaho, the *Scirpus microcarpus* plant association is most commonly observed in seeps and riparian zones in northern Idaho (Jankovsky-Jones 1997c, 1999b), but it is also known from the Portneuf River drainage in southeast Idaho (Jankovsky-Jones et al. 2000). The association is known from Washington (e.g., Evans 1989), northern Utah (Padgett et al. 1989), and throughout Oregon. It has been described from the Blue Mountains where it is relatively frequently observed (Kovalchik 1987, Evenden 1989, Crowe and Clausnitzer 1997, Oregon Natural Heritage Program 1999). The *Scirpus microcarpus* plant association is found on a variety of sites ranging from riparian zones and floodplains to fens and springs. The stand observed on the Boise River occupied a seasonally flooded swale in a cattle pasture that is subirrigated in the spring from groundwater and is moist from overland irrigation flow in the summer (Jankovsky-Jones et al. 2000). The soil was organically rich silt loam of alluvial origin. *Scirpus microcarpus* dominated a 50 m long section of the swale with about 70% cover. *Eleocharis palustris* (with 50% cover) formed a low herbaceous layer. *Carex lanuginosa and Scirpus americanus* were both common, having 20% cover each. Less common mesic graminoid species (with 1 to 3% cover) were *Carex vulpinoidea, Juncus articulatus, J. balticus*, and *Scirpus acutus* (Jankovsky-Jones et al. 2000). No forbs had high cover, though *Lythrum salicaria* and *Polygonum* spp. (*Polygonum amphibium* and *P. hydropiper*) were noticeable.

Scirpus pallidus

Pale bulrush

(1 plot)

The *Scirpus pallidus* plant association occurs infrequently in southwestern Idaho along spring creeks and in subirrigated wetlands (Moseley 1998). It was observed as a cover type only at the Hixon Columbian Sharptailed Grouse Habitat Management Area, where this tall bulrush totally dominated a small, subirrigated slope in the Sage Creek drainage. *Glyceria elata, Juncus tenuis, Agrostis stolonifera, Carex subfusca*, and *Epilobium ciliatum* were the only associates, all with trace cover (Moseley 1998). This distinctive bulrush is widespread at low elevations in the west and it is conceivable that other occurrences of this tentative community type will be documented with more inventories. Similar *Scirpus* spp., such as *Scirpus fluviatilis* and *S. glaucus* (an exotic hybrid species), are occasionally observed in wetlands and riparian zones of southwestern Idaho. *Scirpus fluviatilis* is sometimes found on low elevation river banks but large patches have not been observed (Moseley 1999). Large patches of emergent *Scirpus glaucus* have been observed at Lake Lowell Reservoir in southwestern Idaho (Jankovsky-Jones et al. 2000). Further plot sampling of *Scirpus pallidus* and other *Scirpus* spp. dominated plant associations (other than *Scirpus acutus/S. validus associations*) is needed in Idaho.

Unclassified vernal pool associations

(3 community observations)

Three observations of vernal pools were documented in southwest Idaho, though no plots were sampled in reference areas (Jankovsky-Jones et al. 2000, Rust et al. 2000). Each set of vernal pools differed in vegetative composition, landform setting, and hydrology. Though not identical, these sites roughly fit the classic definition of vernal pools from Mediterranean climates and have analogous vegetation. Vernal pools are defined as precipitation filled seasonal wetlands flooded during the early growing season (supporting aquatic or amphibious plant growth), followed by a saturated soil stage (supporting terrestrial plant growth), and culminating in extreme and long-lasting soil desiccation (supporting drought tolerant plant growth) (Zedler 1987, Witham et al. 1996). Soils are typically clay-rich and underlain by an impervious duripan created by, for example, a clay lens or bedrock. Vernal pools in Idaho differ in several ways. They often have limited growth of aquatic or amphibious plants (though *Eleocharis palustris* is an exception), possibly due to the late starting growing season (e.g., late March and April) during inundation periods. In addition to precipitation and snowmelt, some vernal pools in Idaho receive a limited amount of groundwater and/or overland flood flow during brief spring runoff periods in drainages (Moselely 1999, Jankovsky-Jones et al. 2000, Rust et al. 2000).

One vernal pool observed on the basaltic plateau of the Snake River Birds of Prey National Conservation Area (elevation 3,040 feet), occupied closed depressions within a rocky ephemeral drainage.

These types of depressions are occasionally observed in ephemeral drainages throughout southwest Idaho and are fed by snowmelt and rainstorm runoff, mainly in the winter and spring. The rest of the drainage may be dry but the depressions, with claypans perched on bedrock, hold water into late spring and support vernal pool species. In this vernal pool type, *Deschampsia danthonioides* was the most abundant species, with patchy *Juncus balticus* present. Annual vernal pool species were common, including *Epilobium brachycarpum*, *Gnaphalium palustre*, *Juncus bufonius*, *Myosurus minimus*, *Navarretia intertexta*, *Plagiobothrys scouleri*, *Psilocarphus brevissimus*, and *Veronica peregrina*. A drier zone ringed the pools and was dominated by *Artemisia cana*, *Lomatium grayii*, *Sitanion hystrix*, and weedy species (e.g., *Bromus tectorum*, *Ranunculus testiculatus*, *Polygonum aviculare*, and *Vulpia myuros*). Evans (1989) and Crowe et al. (1994) studied vernal pools from basalt scabland channels in eastern Washington that were similar in composition to these in Idaho. These pools were dominated by *Deschampsia danthonioides*, *Eleocharis palustris*, and various annual forbs (e.g., *Downingia elegans*, *Navarretia intertexta*, *Myosurus aristaus*, *Polygonum* spp., and *Psilocarphus oregonus*). They also included a higher zone of more xeric species (e.g., *Allium geyeri*, *Apera interrupta*, *Bromus tectorum*, *Grindelia* spp., *Lomatium grayii*, *Poa juncifolia*, and *P. secunda*). Similar *Deschampsia danthonioides* dominated vernal pools have been documented from scabland channels in eastern Oregon (Crawford 2000). In California, *Deschampsia danthonioides* is considered the most common vernal pool grass, often forming a ring on the upper margins of pools (Zedler 1987). These vernal pools in eastern Washington, Oregon, and southwestern Idaho appear analogous to the "Northern basalt flow vernal pool" type described from the Modoc Plateau of northeastern California (Sawyer and Keeler-Wolf 1995).

Another type of vernal pool was observed in closed swales and depressions on high alluvial bars, terraces, and islands of the lower Payette River at Birding Islands (Jankovsky-Jones et al. 2000). These river floodplain vernal pools have been anecdotally noted on the lower Boise River and elsewhere in the Payette River system on similar landforms. These vernal pools are probably underlain by clay lenses and pool both rain or snow runoff as well as occasional river floodwater (not every year) and groundwater (during high flows) (Jankovsky-Jones et al. 2000). The pools dry by mid-summer and support a high diversity of vernal pool and riverine mudflat species. For example, a mixture of exotic and native annual graminoids dominated the Payette River vernal pools. These included *Cyperus* spp. (e.g., *Cyperus aristatus* and *C. erythrorhizos*), *Echinochloa crus-galli*, *Eleocharis* spp. (e.g., *Eleocharis bella* and *E. bolanderi*), *Eragrostis* spp. (e.g., *Eragrostis hypnoides*, *E. lutescens*, and *E. pectinacea*), *Crypsis alopecuroides*, *Leptochloa fascicularis*, *Muhlenbergia minutissima*, *Panicum capillare*, and *Polypogon monspeliensis* (Jankovsky-Jones et al. 2000). *Agrostis* spp., *Eleocharis palustris*, and *Phalaris arundinacea* were present in the wettest portions of pools. A diverse collection of annual vernal pool forbs were also common, especially *Epilobium pygmaeum*, *Gnaphalium palustre*, *Plagiobothrys scouleri*, and *Veronica peregrina*. Other vernal pool forbs (including *Alisma plantago-aquatica*, *Centunculus minimus*, *Gratiola neglecta*, *Lindernia dubia*, *Marsilea vestita*, *Mollugo verticillata*, *Rotala ramosior*, *Rumex crispus*, *Polygonum lapathifolium*, *Trifolium variegatum*, and *Xanthium strumarium*) were also observed on adjacent banks, mudflats, and alluvial bars at the low water line of rivers and sloughs (Jankovsky-Jones et al. 2000). The vast majority of genera of these forbs and graminoids are commonly represented in vernal pools in California (Zedler 1987, Witham et al. 1996) and in prairie playas (ephemeral wetlands) of the southern Great Plains (Langendoen 1999?). The drier margins of pools along the Payette River supported various weedy or early seral species (e.g., *Artemisia ludoviciana*, *Barbarea orthoceras*, *Bromus japonicus*, *Conyza canadensis*, *Coreopsis atkinsoniana*, *Equisetum laevigatum*, *Erodium cicutarium*, *Grindelia squarrosa*, *Polygonum aviculare*, and others).

The Duck Valley area of the Owyhee Plateau hosts large ephemeral wetlands, many of which support vernal pools. Many vernal pools naturally form in clay-bottomed swales found in valleys, basins, and on basalt tablelands. One such set of pools, observed at Payne Creek on fine-textured alluvial soils of the Duck Valley basin, was characterized by a zone of *Eleocharis palustris* dominance on the wettest soil that was ringed by a *Downingia bacigalupii* dominated zone (Rust et al. 2000). Patches of *Eryngium alismifolium*, *Camissonia tanacetifolia*, and *Marsilea vestita* were scattered throughout the vernal pool area. Other vernal pool species observed were *Alopecurus* spp., *Beckmannia syzigachne*, *Epilobium densiflora*, *Carex* spp., *Chenopodium* spp., *Juncus balticus*, *Muhlenbergia richardsonis*, *Myosurus* spp., *Navarretia intertexta*, *Plagiobothrys scouleri*,

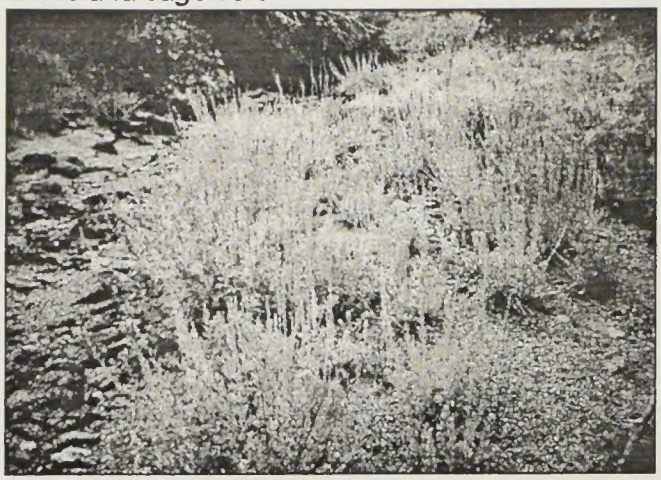
Polypogon monspeliensis, *Polygonum aviculare*, *Rorippa* spp., and *Rumex crispus* (Rust et al. 2000). Many of these genera are common in vernal pools on alluvial soil in California (Zedler 1987, Witham et al. 1996). Vernal pool margin species observed in Duck Valley included *Artemisia cana*, *A. tridentata* (ssp. *vaseyana* and *wyomingensis*), *Elymus cinereus*, *Epilobium brachycarpum*, *Hordeum brachyantherum*, *Iva axillaris*, *Poa nevadensis*, *Potentilla gracilis*, and *Trifolium* spp. (Rust et al. 2000). *Eleocharis palustris* and/or *Downingia bacigalupii* dominated vernal pools, with an *Artemisia cana* margin, have been observed elsewhere on the Owyhee Plateau (e.g., South Big Springs Butte Basin reference site) (Moseley 1999, Rust et al. 2000). In addition, numerous vernal pool-like depressions have been created in Duck Valley (and elsewhere) by hydrologic alterations of wetlands and ephemeral drainages (e.g., reservoir construction for livestock, ditch, and dike construction) (Moseley 1999, Rust et al. 2000). Other vernal pool-like depressions have been observed in ephemeral drainages. For example, in the intermittent Little Owyhee River drainage on the 45 Ranch, pools dominated by *Machaerocarpus californicus* and *Ranunculus aquatilis*, ringed by vernal species (e.g., *Camissonia tanacetifolia*, *Cyperus aristatus*, *Downingia latea*, *Lilaea scilloides*, and *Limosella aquatica*) have been documented (Moseley 1999). These pools, however, are fed predominantly by river flow and groundwater and are more "ephemeral" than "vernal." In general, plot data and systematic study of vernal pools and vernal pool-like vegetation is lacking in southwest Idaho. Although *Lepidium davisii* and *Eleocharis palustris* vernal pools have been well documented, more study of other types (e.g., those dominated by *Alopecurus* sp., *Camissonia tanacetifolia*, *Downingia* spp., *Eryngium alismifolium*, *Muhlenbergia richardsonis*) is needed.

Graminoid dominated plant associations expected to occur or noted but not sampled

Several graminoid dominated wetland and riparian plant associations were noted, but not sampled, in the study area. These associations are dominated by *Agrostis exarata-Agrostis scabra* (on recent alluvium), *Alopecurus aequalis* (streams and springs), and *Juncus ensifolius* (springs and terraces) (Crowe and Clausnitzer 1987, Oregon Natural Heritage Program 1999, Jankovsky-Jones et al. 2000, Rust et al. 2000). The *Spartina pectinata* plant association is known to occur below Hells Canyon Dam on the Snake River, just north of the study area. *Spartina gracilis*, *Poa juncifolia*, and *Puccinellia nuttalliana* dominated mesic alkaline meadows are known to occur on the Snake River Plain and elsewhere in eastern Idaho (Jankovsky-Jones et al. 2000), but they were not documented in the study area. Other graminoid plant associations expected in the study area (but not sampled or observed) include those dominated by other *Carex* species (e.g., *Carex amplifolia*, *C. aquatilis*, *C. lenticularis*, *C. microptera*, *C. vesicaria*, or others), *Deschampsia cespitosa*, other *Glyceria* spp. (e.g., *Glyceria borealis* or *G. elata*), and *Puccinellia pauciflora* (Crowe and Clausnitzer 1987, Manning and Padgett 1995, Oregon Natural Heritage Program 1999, Jankovsky-Jones et al. 2000). Since the study area was concentrated in low to moderate elevations in the sagebrush-steppe and juniper zones, montane or subalpine meadow environments were not sampled. Thus, *Deschampsia cespitosa* and other *Carex* spp. dominated meadows were not documented. Numerous human-induced graminoid associations were noted but not sampled. *Agrostis stolonifera*, *Bromus inermis*, *Hordeum jubatum*, *Phalaris arundinaceae*, and *Phleum pratense* were some of the dominance types noted (Moseley 1999, Jankovsky-Jones et al. 2000). Exotic annual grass species, mainly *Echinochloa crus-galli*, annual *Eragrostis* spp., and *Crypsis alopecuroides*, commonly form dominance types on reservoir drawdown zones and riverine mudflats.

FORB ASSOCIATIONS
Artemisia ludoviciana

Louisiana sagewort n=4



RANGE

The *Artemisia ludoviciana* plant association is known from eastern Washington, eastern Oregon, and southern Idaho. It is widespread in the Columbia Basin of Washington, sampled in Lincoln and Adams counties, and observed throughout dry-land areas (Crawford 2000). It is also known from the Columbia Basin of eastern Oregon and the foothills of the Blue Mountains (Crawford 2000, Oregon Natural Heritage Program 1999). The plant association is found at low elevations on the lower Clearwater River of Idaho (Lichthardt 1992) and along the Snake and Columbia rivers (Asherin and Claar 1976). It occurs at moderate elevations in Owyhee County of southwest Idaho (Moseley 1998, 1999, Rust et al. 2000). Though generally found in ephemerally or intermittently wet drainages, the type was also found in a vernal pool in Fremont county of eastern Idaho (Jankovsky-Jones 1996). *Artemisia ludoviciana* is a common pioneer species expected in ephemerally or intermittently moist, but well-drained, habitats throughout the region.

ENVIRONMENT

The *Artemisia ludoviciana* plant association usually occurs on ephemerally or intermittently moist, but well-drained, coarse-textured substrates. It is known from 840 feet elevation on the Clearwater River in Idaho (Lichthardt 1992) and averages 1657 feet elevation in eastern Washington (Crawford 2000). In contrast, the type is found between 4350 and 6000 in eastern Oregon and southern Idaho (Jankovsky-Jones 1995, Moseley 1998, 1999, Rust et al. 2000, Oregon Natural Heritage Program 1999). The community usually occupies alluvial terraces or rocky, sandy, and gravelly bottoms of ephemeral streams, intermittent drainages, and overflow channels of perennial steams (Moseley 1998, 1999, Rust et al. 2000, Crawford 2000). Sites may or may not flood annually, though most surfaces appear frequently scoured by flooding. Flooding regimes vary from intense annual flooding to intermittent flooding by heavy rain or snowmelt (Moseley 1998, Moseley 1999, Rust et al. 2000, Crawford 2000). Stream channels are from 2 to 15 m wide with gradients from 0 to 25%. Stream channels are orders 1, 2, and 3 and Rosgen types C3, F3, and G3 (intermittent) and D3 (perennial) with varying degrees of entrenchment (Moseley 1998, 1999, Crawford 2000, Oregon Natural Heritage Program 1999).

SOILS

Soils are coarse and well-drained sands and gravels filling space between cobbles and stones (Moseley 1998, 1999, Rust et al. 2000, Crawford 2000).

VEGETATION COMPOSITION

This community is characterized by the dominance of 30 to 50 cm tall *Artemisia ludoviciana* with cover ranging from about 10% to 80% (usually 40% or less) (Crawford 2000, Jankovsky-Jones 1996, Moseley 1998, 1999, Rust et al. 2000, Oregon Natural Heritage Program 1999). Shrubs such as *Artemisia cana, Salix* spp., and *Rosa woodsii* are occasionally present with trace cover (Rust et al. 2000). The associated understory species are quite variable throughout the range

SPECIES	CON.	COVER	MIN	MAX
FORBS				
Achillea millefolium	50	0.5	0	1
Artemisia ludoviciana	100	25.0	10	40
Aster ascendens	50	0.5	0	1
GRAMINOIDS				
Agropyron smithii	50	0.5	0	1
Eleocharis palustris	50	2.8	0	10
Hordeum brachyantherum	50	0.5	0	1
Juncus balticus	50	1.0	0	3
Muhlenbergia richardsonis	50	3.3	0	10
Polypogon monspeliensis	75	0.8	0	1

of the association but graminoids are most common. Rangewide, *Muhlenbergia richardsonis, Eleocharis palustris, Agrostis stolonifera, Apera interrupta, Juncus balticus, Poa compressa, P. secunda,*

Agropyron repens, A. smithii, A. trachycaulum and *Bromus tectorum* are occasionally present with cover averaging trace to 15% (Crawford 2000, Jankovsky-Jones 1995, Moseley 1998, 1999, Rust et al. 2000, Oregon Natural Heritage Program 1999). Few forb species are prominent, though in eastern Washington *Lomatium columbianum* and *L. macrocarpum* are occasionally important. *Achillea millefolium, Haplopappus* spp. (e.g., *H. hirtus, H. uniflorus* var. *howellii*), annual *Polygonum* spp., *Iva axillaris, Rumex* spp., and *Grindelia squarrosa* are also sometimes associated with low cover. Overall, vegetation cover is mostly open with cover and composition varying both yearly and throughout the growing season (Crawford 2000).

ADJACENT COMMUNITIES

Plant associations adjacent to stands of *Artemisia ludoviciana* within ephemeral or intermittent stream channels include *Muhlenbergia richardsonis* and *Salix exigua*/Barren (Moseley 1998, Rust et al. 2000). Surrounding riparian vegetation may include *Artemisia cana* and *Artemisia tridentata* ssp. *tridentata/Elymus cinereus* associations while uplands are usually dominated by *Artemisia tridentata* ssp. *wyomingensis* or *Juniperus occidentalis* (Moseley 1998, 1999, Rust et al. 2000).

MANAGEMENT CONSIDERATIONS

The palatibility and forage value of *Artemisia ludoviciana* for livestock is poor to fair (USDA 2000). Due to the overall lack of forage and rocky substrate, livestock grazing is not usually a significant influence on the *Artemisia ludoviciana* community. The *Artemisia ludoviciana* community type is probably maintained by periodic disturbances such as flooding and easily re-sprouts from rhizomes or colonizes bare soil with its wind-dispersed seeds after fire (USDA 2000). *Artemisia ludoviciana* is easily established, fast growing, and persistent on disturbed sites, providing excellent soil cover and stabilization (USDA 2000). It is useful for riparian restoration. *Artemisia ludoviciana* is also used by Native Americans for ceremonial, purification, medicinal, and other purposes (USDA 2000).

SUCCESSIONAL DYNAMICS

Artemisia ludoviciana is a common, pioneering rhizomatous species tolerant of drought (USDA 2000). In addition, it is fast growing and easily established. The *Artemisia ludoviciana* association is probably maintained by periodic disturbances such as flash floods or short-term flooding of coarse soils. *Artemisia ludoviciana* is top-killed by fire but easily re-sprouts from rhizomes and colonizes bare soil with its small, wind-dispersed seeds (USDA 2000). Other successional information is not known.

WILDLIFE FUNCTIONS

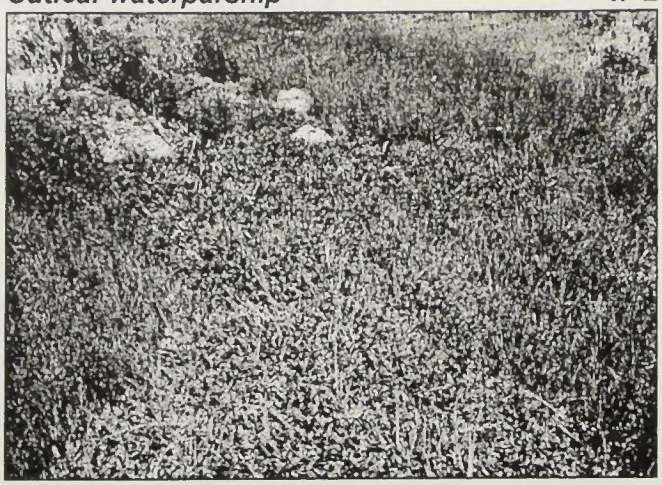
Though seasonally important, especially for mule deer, *Artemisia ludoviciana* has poor to fair palatibility for most wildlife and birds and provides little habitat or cover (USDA 2000).

CLASSIFICATION COMMENTS

The *Artemisia ludoviciana* community type is known from eastern Washington, eastern Oregon, and Idaho. It is widespread in the Columbia Basin of Washington (Crawford 2000). It is also known from the Columbia Basin of eastern Oregon (Oregon Natural Heritage Program 1999) and a very similar type (*Artemisia ludoviciana/Galium aparine*) is known from the foothills of the Blue Mountains (3 plots sampled) (Crawford 2000). The community is also described from a plot on the lower Clearwater River of Idaho (Lichthardt 1992). A very similar type dominated by *Artemisia lindleyana* has been observed below the high water line on the lower Snake and Columbia Rivers. It has also been sampled in Owyhee County in southwest Idaho (e.g., three plots near the South Fork Owyhee River on the 45 Ranch Allotment; one plot in the Owyhee Mountains; and sampled without plot data on the Owyhee Plateau near Grasmere (Moseley, 1998, 1999, Rust et al. 2000). The type was also observed (no plot data) in a vernal pool in Fremont County of southeastern Idaho (Jankovsky-Jones 1995). This associaton is based on the clear dominance of *Artemisia ludoviciana.* Associated species composition varies greatly and cover of these species is usually very low.

Berula erecta

Cutleaf waterparsnip **n=2**



RANGE

The *Berula erecta* plant association is known from headwater channels of two small springs in Spring Creek Basin, a tributary to the South Fork Owyhee River canyon, on the 45 Ranch Allotment in southwest Idaho. It is also known from one spring at Halverson Lake in the Snake River canyon below Swan Falls Dam, Idaho. Though this type appears naturally rare, much of its potential spring-channel habitat has been severely altered by livestock use and hydrologic alteration.

ENVIRONMENT

The *Berula erecta* plant association is found at 2,320 feet elevation in the Snake River canyon and from 4,990 to 5,020 feet elevation in Spring Creek Basin. The association is rooted in shallow, entrenched channels of perennial springs emitting from the base of old basalt talus. Consequentially, the channels are full of basalt rocks. Silty or fine sandy soil is deposited around rocks or completely covers the channel bottoms. The spring-channels are 1 to 5 m wide, have less than 10% gradients, and the water is about 10 cm deep. There is apparently no annual flooding above the channel banks. The aspect of all three plots was between 180 and 190 degrees, though canyon walls do provide late afternoon shade.

SOILS

Soils include silts or fine sands in channel bottoms.

VEGETATION COMPOSITION

Berula erecta, averaging 30 to 60 cm tall, is rooted under the water and dominates this association with between 50 and 98% cover. When combined with other aquatic rooted forbs such as *Rorippa nasturtium-aquaticum* (90% cover; only in the Halverson Lake plot), *Veronica americana* (in 2 plots; 10% or less cover), *Angelica kingii* (one plot in Spring Creek Basin; 10% cover), *Epilobium watsonii, Lemna minor,* and *Polygonum* spp., the whole water surface is covered with vegetation. Banks and shallower water of the spring-channels had 10% or less cover of *Agrostis stolonifera* and *Juncus* spp. (*J. balticus, J. torreyi,* or *J. ensifolius*) with trace amounts of *Carex nebrascensis, Aster* spp., or weedy herbs such as *Polypogon monspeliensis.*

SPECIES	CON	COVER	MIN	MAX
SHRUBS				
Rosa woodsii	50	0.5	0	1
FORBS				
Achillea millefolium	50	0.5	0	1
Angelica kingii	50	5	0	10
Aster ascendens	50	0.5	0	1
Aster eatonii	50	0.5	0	1
Berula erecta	100	89	80	98
Epilobium ciliatum	50	0.5	0	1
Mentha arvensis	50	0.5	0	1
Plantago major	50	1.5	0	3
Potentilla gracilis	50	0.5	0	1
Taraxacum officinale	50	0.5	0	1
Veronica americana	50	0.5	0	1
GRAMINOIDS				
Agrostis stolonifera	100	10	10	10
Carex nebrascensis	100	1	1	1
Hordeum brachyantherum	50	0.5	0	1
Juncus balticus	50	5	0	10
Juncus ensifolius	50	1.5	0	3
Poa nevadensis	50	1.5	0	3
Poa pratensis	50	1.5	0	3
Polypogon monspeliensis	50	0.5	0	1

ADJACENT COMMUNITIES

Adjacent spring-channel associations at Halverson Lake include those dominated by *Urtica dioica* and *Scirpus acutus.* In Spring Creek Basin, *Carex nebrascensis* associations are on adjacent streambanks. Surrounding upland vegetation is dominated by *Sarcobatus vermiculatus, Atriplex canescens, Artemisia tridentata* ssp. *wyomingensis, Artemisia arbuscula,* or *Juniperus occidentalis* with weedy understories (e.g., *Bromus tectorum*).

MANAGEMENT CONSIDERATIONS

In Spring Creek Basin on the 45 Ranch Allotment one stand of *Berula erecta* is divided by a fence with a portion excluded from cattle grazing and a portion

grazed. The cover of *Berula erecta* is significantly higher in the excluded portion of the spring-channel. At Halverson Lake, where *Berula erecta* cover is lower and *Rorippa nasturtium-aquaticum* dominates, there is heavy cattle grazing and trampling, as well as disturbance by off-highway vehicles. Continued disturbance may possibly result in the loss of *Berula erecta*.

SUCCESSIONAL DYNAMICS

In stands excluded from cattle grazing, *Berula erecta* has significantly higher cover than in non-excluded stands. This indicates that the *Berula erecta* association may be a late-seral type. At Halverson Lake, where *Berula erecta* cover is lower and *Rorippa nasturtium-aquaticum* dominates, there is heavy cattle grazing and trampling, as well as disturbance by off-highway vehicles. Continued disturbance may possibly result in the loss of *Berula erecta* and complete dominance by *Rorippa nasturtium-aquaticum*.

WILDLIFE FUNCTIONS

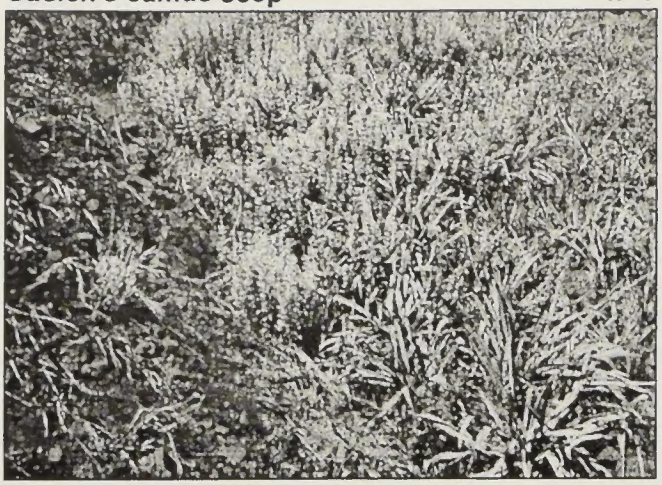
Information is not available.

CLASSIFICATION COMMENTS

The *Berula erecta* plant association is a previously unclassified type. This may represent an aquatic association that has been overlooked in other wetland and riparian classifications. It has been described from only three plots from southwest Idaho. One of these plots has very high cover of *Rorippa nasturtium-aquaticum,* co-dominant with *Berula erecta,* and may represent a degraded condition or mid-seral state. Nevertheless, the presence of *Berula erecta* with high cover separates this association from the *Rorippa nasturtium-aquaticum* community type.

Camassia cusickii seep

***Cusick's camas* seep** n=1



RANGE

This association is endemic to the southern end of Hells Canyon, mostly in Oregon, with a few occurrences in adjacent Idaho. In Oregon it occurs in portions of the Imnaha River and Pine Creek drainages and in Hells Canyon along the main Snake River (Johnson and Simon 1987). Across the Snake River in Idaho, occurrences are known from an area of the canyon near Oxbow Dam.

ENVIRONMENT

The characteristic site for this association is beneath basalt rims on colluvial inter-rim locations where seepage water persists well into the early summer, permitting the large bulbiferous camas plants to grow and flower in dense patches. As succeeding rim levels are descended from the ridgetop, the seepage duration is reduced and the camas community usually changes from continuous patches to separated individuals within the adjacent bunchgrass communities. Occurrences of this community occur between 3,000 and 6,000 feet on southerly aspects with slopes averaging 40% (Johnson and Simon 1987).

SOILS

The highly oxidized reddish soils are shallow with clay to clay loam surface horizons. The parent material is basalt and the depth averaged 40 inches (Johnson and Simon 1987).

VEGETATION COMPOSITION

The *Camassia cusickii* seep community contains 40-80% foliar cover of camas, almost to the exclusion of other plants. Rock and gravel make up the remainder of site coverage. Frequently associated herbaceous species, generally in low cover, include *Artemisia ludoviciana, Perideridia montana, Achillea millefolium, Penstemon venustus, Allium acuminatum,* and *Antennaria luzuloides* (Johnson and Simon 1987).

SPECIES	CON	COVER	MIN	MAX
FORBS				
Artemisia ludoviciana	100	20	20	20
Camassia cusickii	100	80	80	80
Helianthus annuus	100	1	1	1
Lactuca serriola	100	1	1	1
Madia glomerata	100	1	1	1
Phacelia heterophylla	100	1	1	1
Potentilla gracilis	100	1	1	1
Triodanis perfoliata	100	1	1	1
GRAMINOIDS				
Bromus brizaeformis	100	1	1	1

ADJACENT COMMUNITIES

This association occurs within a matrix of bunchgrass-dominated communities on the canyon slopes. The dominant bunchgrass is usually *Agropyron spicatum* (Johnson and Simon 1987).

MANAGEMENT CONSIDERATIONS

Wild and domestic ungulates can readily damage stands by disturbing the soil when it is still saturated. Thus, sheep use before mid-July could be detrimental. Once the plants have dispersed seed and the seepage dries, grazing animals will have minimal impact on the site (Johnson and Simon 1987).

SUCCESSIONAL DYNAMICS

Camassia cusickii seep stands are located in areas where past sheep grazing has resulted in adjacent bunchgrass communities that are in degraded ecological condition. Degraded camas sites contain greater abundance of *Achillea millefolium, Polygonum douglasii, Antennaria luzuloides,* and *Lomatium dissectum* (Johnson and Simon 1987).

WILDLIFE FUNCTIONS

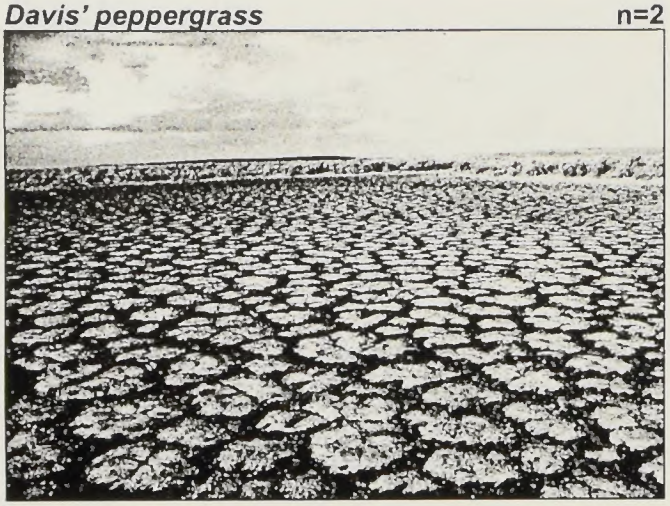
Elk appear to relish the leaf tips and inflorescences of *Camassia cusickii.* Sites have been observed in Idaho and Oregon where elk have uniformly grazed camas patches while adjacent *Agropyron spicatum* communities were unused.

CLASSIFICATION COMMENTS

Classification is based on eight plots in Oregon (Johnson and Simon 1987) and supplemented with observations in Idaho.

Lepidium davisii

Davis' peppergrass **n=2**



RANGE

The *Lepidium davisii* vernal pool association is known from about 300 playas scattered from south-central Idaho across southwest Idaho, extending into north-central Nevada and southeast Oregon (Moseley 1995). There are six distinct clusters, or distribution centers, in this range: 1) Mountain Home Desert (Ada, Elmore counties); 2) Bruneau Desert (Owyhee County); 3) Salmon Falls Creek (Twin Falls County); 4) South Fork Owyhee (Owyhee, Elko, Malheur Counties); 5) Alvord Desert (Malheur County); 6) Barren Valley (Malheur County) (Moseley 1995). The species has been extirpated from several playas and other playas have been degraded by OHV use, livestock water developments, weed invasion, and livestock grazing (Moseley 1995b). Surveys indicate the association is found on about 50 to 60% of suitable playas in its range.

ENVIRONMENT

The *Lepidium davisii* vernal pool plant association occurs on playas on basaltic plains mostly within the *Artemisia tridentata* ssp. *wyomingensis* zone. Except in the Mountain Home Desert where elevations range from 2950 to 3160 feet, *Lepidium davisii* vernal pool associations occur between 4010 and 5430 feet elevation (Moseley 1995b). The associations occur on internally drained playas that shallowly pool rain and snowmelt (less than 10 cm deep) in the winter, spring, and occasionally early summer. While saturated during these periods, the playas soon dry to a rock-hard, whitish colored, clay bottom. The clay shrinks and swells through the year, forming polygonal cracks upon drying and differentially sorting volcanic gravels, cobbles, and stones on its surface into a "stone net" (Moseley 1995b). *Lepidium davisii* often reproduces in the soil cracks.

SOILS

The clay soils do not have alkali deposits (they are pH circumneutral; Moseley 1995b) and are mapped as the Playas-Duric Natrargids association (Moseley 1998).

VEGETATION COMPOSITION

Very few plant species can tolerate the environmental conditions in vernal pools supporting *Lepidium davisii.* The species dominates the playas with cover usually 3 to 5% (Moseley 1995b, 1998). The year to year cover, density, and reproduction of *Lepidium davisii* is variable, depending on annual precipitation and climate (Moseley 1995b). Extreme wetness inhibits growth on certain portions of playas. Drought slows reproduction and disturbance promotes invasion of the playa by weedy species or perennials. The only other species able to regularly grow with *Lepidium davisii* on the playas are *Atriplex confertifolia, Artemisia cana, Halogeton glomeratus, Salsola kali,* and *Cymopterus longipes*—all with trace cover (Taylor-Grant and DeBolt 1995, Moseley 1995b, 1998). Other species occasionally observed on playas, or more commonly on the margins of disturbed playas, but always with low cover, include *Chrysothamnus nauseosus, Artemisia tridentata* ssp. *wyomingensis, Sitanion hystrix, Poa secunda, Iva axillaris, Astragalus calycosus, Allium anceps, Tetradymia glomerata, Eriogonum microthecum,* and *Haplopappus acaulis.*

SPECIES	CON.	COVER	MIN	MAX
FORBS				
Cymopterus ibapensis	100	2	1	3
Haplopappus acaulis	50	0.5	0	1
Lepidium davisii	100	3	3	3

ADJACENT COMMUNITIES

Vegetation adjacent to vernal pools supporting *Lepidium davisii* includes *Artemisia tridentata* ssp. *wyomingensis* types (usually with *Sitanion hystrix* and *Poa secunda* understories), *Artemisia cana* types, or *Atriplex confertifolia* types (Moseley 1995). There is often a narrow band of heterogeneous vegetation immediately bordering playas dominated by *Chrysothamnus nauseosus, Atriplex confertifolia,* weedy species, *Poa secunda, Sitanion hystrix,* and other species present that can tolerate the wet-dry cycle conditions of playa margins.

MANAGEMENT CONSIDERATIONS

The persistence of *Lepidium davisii* depends on the maintenance of its playas. *Lepidium davisii* is apparently not a preferred forage of livestock. However, if livestock water developments or salt are located in the playa or adjacent, then direct trampling of *Lepidium davisii* and alteration of the micro-environment (promoting plant competition) may occur (Taylor-Grant and DeBolt 1995, Moseley 1995b). Damage occurs mostly when the soil is wet. Similar problems can result from OHV use on playas. In addition, digging of stock ponds within playas physically destroys *Lepidium davisii* habitat and alters the hydrology of the vernal pools (Moseley 1995b). Though fuels and conditions are rarely sufficient on playas to carry fire through *Lepidium davisii,* fires in surrounding rangelands may lead to erosion and soil deposition directly on the playas, negatively impacting *Lepidium davisii* associations (Taylor-Grant and DeBolt 1995; Moseley 1995b).

SUCCESSIONAL DYNAMICS

The *Lepidium davisii* vernal pool association is long-lived and maintained by the physical stability of the playa habitat (Moseley 1995b). However, disturbances to playas can initiate successional changes. For example, *Halogeton glomeratus, Salsola kali, Iva axillaries,* and *Cardaria draba* may invade and directly compete with *Lepidium davisii* (Moseley 1995b). The litter of these plants (especially tumbleweeds of *Salsola kali*) can build up on playas and directly smother *Lepidium davisii* (Taylor-Grant and DeBolt 1995). In addition, sediment from wind and water erosion on degraded rangelands can deposit on playas. This creates habitats for xeric perennial species and exotic weeds to invade while decreasing the habitat for *Lepidium davisii* (Taylor-Grant and DeBolt 1995).

WILDLIFE FUNCTIONS

Information is not available.

CLASSIFICATION COMMENTS

This association is characterized by obvious dominance of *Lepidium davisii* with few associated plant species. *Lepidium davisii* vernal pools are known from about 300 playas in southwest Idaho, north-central Nevada, and southeast Oregon. Since *Lepidium davisii* is tracked as a globally rare plant species, good habitat descriptions for each population occurrence exist. From this information, a repeating, stable *Lepidium davisii* vernal pool association is recognized. Though few plots have been sampled for classification purposes (e.g., only two plots in Idaho, Moseley 1998), the vegetation composition and structure of these associations are distinct, relatively simple, and easily recognized.

Polygonum amphibium (coccineum)

Water smartweed **n=0**

RANGE

The *Polygonum amphibium* plant association is found in Idaho, California, Oregon, Washington, Montana, and Colorado.

ENVIRONMENT

Polygonum amphibium is an aggressive invader of shallow water and exposed mudflats where there is minimal wave action, forming dense, monotypic stands (Hansen et al. 1995). This species spreads rapidly if it is exposed to eutrophic (nutrient rich) conditions and can completely cover water bodies greatly reducing diversity of aquatic species (Guard 1995). The association occurs in shallow backwater sloughs and along shorelines of reservoirs, lakes, ponds and marshes.

SOILS

This plant association type occurs on most soil textures from fine clay to sandy loam, and is intolerant of saline or alkaline conditions (Hansen et al. 1995).

VEGETATION COMPOSITION

Polygonum amphibium occurs as a near monoculture with 98% cover. *Lemna minor, Potamogeton natans, Spirodela polyrhiza,* and *Wolffii* spp. are occasionally present (Hansen et al. 1995).

ADJACENT COMMUNITIES

Adjacent associations may include those dominated by *Carex* spp., *Typha latifolia,* or *Scirpus* spp., aquatic beds, or open water. Adjacent drier associations are a wide variety of types including upland types (Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

Herbage production of this plant association rates from low to moderate and is of low palatability to livestock (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Shoreline vegetation around reservoirs is composed primarily of early successional species that become established during either the fall or the spring when water levels are low. Repeated annual drawdown perpetuates this disturbance and associated weedy vegetation (Hansen et al. 1995). *Polygonum amphibium* is adapted to a variety of conditions; it can grow prostrate, creeping on land, or in several meters of water (Guard 1995).

WILDLIFE FUNCTIONS

The seeds of *Polygonum amphibium* are important food for ducks, geese, marsh birds, shorebirds, upland game birds, and small mammals (Guard 1995). *Polygonum amphibium* is used by a wide variety of waterfowl for nesting or nest building and the plants provide shelter for a variety of aquatic life forms. Shore vegetation provides habitat for terrestrial wildlife and certain fish species (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Some taxonomic issues need to be understood before description of this plant association can be fully developed. Some sources consider *Polygonum amphibium* and *Polygonum coccineum* synonymous. The two species can be distinguished by characteristics of the panicle with *Polygonum amphibium* having a shorter, more compact inflorescence while *Polygonum coccineum* has an inflorescence that is elongate (4 cm). *Polygonum coccineum* is an aggressive species that is considered a noxious weed in California. Kartesz (1994) recognizes *Polygonum amphibium* as a full species and considers *Polygonum amphibium* var. *emersum* and *Polygonum coccineum* synonymous.

Typha latifolia

Broad-leaved cattail

RANGE

This association is found in virtually every state in the United States and is likely to be found in most Canadian provinces. It is probably the most commonly "created" wetland type as well.

ENVIRONMENT

This association is found along margins of streams, rivers, ponds, and in overflow channels and backwater sloughs. It will also form stands along roadways and railways, in drainage ditches and elsewhere water collects to a depth of up to 1 m and remains for over half of the growing season (Kittel et al. 1999).

SOILS

Soils are deep, heavy, silty clay loams and organic mucks (Kittel et al. 1999) overlying deposits of fine silts or clays that are often inundated throughout the year (Hansen et al. 1995).

VEGETATION COMPOSITION

This association is dominated by hydrophytic macrophytes, especially *Typha latifolia,* which grow to approximately 2 meters. *T. latifolia* can form dense stands in places, almost to the exclusion of other species. Found in lesser amounts in this community are other typical wetland species, eg,, *Carex* spp., *Scirpus* spp., *Potamogeton* spp., *Lemna* spp., and *Veronica* spp.

ADJACENT COMMUNITIES

This plant association has a wide range and may be present in both riverine and non-riverine wetlands. Thus, adjacent vegetation is highly variable and includes both wetland and upland plant associations that are too numerous to mention.

MANAGEMENT CONSIDERATIONS

Stands of *Typha latifolia* do not provide much forage for livestock. Livestock will enter stands and trample vegetation late in the growing season when other forage is not available. In Montana, it is reported that stands may be converted to the *Carex nebrascensis* association with heavy livestock use (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Typha spp. produce abundant seeds and spread rapidly. Under saturated conditions stands will persist; they are adapted to prolonged submergence (Hansen et al. 1995).

WILDLIFE FUNCTIONS

Typha latifolia stands provide an important source of food, hiding cover, and shade for wildlife. Muskrats will use stems for constructing huts. As long as stands are not too thick, they will be utilized by waterfowl. Deer may also use stands for hiding cover and food. This is critical nesting and roosting habitat for yellow-headed and red-winged blackbirds as well as marsh wrens (Hansen et al. 1995).

CLASSIFICATION COMMENTS

The *Typha latifolia* plant association has been described in numerous classifications throughout the United States. Some local classifications have identified associations such as *Typha latifolia-Sagittaria latifolia* and *Typha latifolia-Scirpus* spp. that are included in this association. *Typha angustifolia* is less common in Idaho and few pure stands have been documented; usually it occurs with and may hybridize with *Typha latifolia*. At the present time stands with *Typha angustifolia* are included in the *Typha latifolia* association.

MISCELLANEOUS FORB PLANT ASSOCIATIONS

Mimulus guttatus

Yellow monkeyflower
(1 plot)

Mimulus guttatus is sometimes found dominating small spring and seep channels on hillsides and cliffs in the northern Rocky Mountains and intermountain area. It is briefly mentioned as a community type in two sources (Norton et al. 1981, Collins 1992). *Mimulus guttatus* is a common component of other spring and seep communities dominated by *Rorippa nasturium-aquaticum* and/or *Veronica americana* (or *V. anagallis-aquatica*), but its dominance is not noted (Padgett et al. 1989, Oregon Natural Heritage Program). It is also commonly observed in the "Thousand Springs Desert Aquatic Ecosystem" in the Snake River canyon of southern Idaho (Jankovsky-Jones et al. 2000), but is never dominant. The *Mimulus guttatus* plant association was sampled only once in southwest Idaho (Moseley 1999). The stand was in the Salmon Falls Creek highlands south of Three Creek, at one of the springs in the Dean Site Exclosure (elevation 6,680 feet). *Epilobium ciliatum* actually had higher cover than *Mimulus guttatus* in this stand, but the two completely dominated a broad spring outflow channel. Water (about 2 to 10 cm deep) was running through the stand. The substrate was gravel and rock. Five graminoids, *Carex athrostachya, Puccinellia pauciflora, Deschampsia elongata, Poa pratensis*, and *Poa palustris*, all had trace cover (Moseley 1999). Surrounding upland communities included *Artemisia tridentata* ssp. *vaseyana* and *Populus tremuloides* types. This type occurs in small stands. The *Mimulus guttatus* plant association has been anecdotally noted ephemerally wet cliff-face seeps in Hells Canyon.

Plant associations expected to occur or noted but not sampled

Numerous wetland and riparian forb dominated plant associations are expected to occur but were not sampled or observed. These include meadow associations noted on the Owyhee Plateau, such as *Camassia quamash*, *Iris missouriensis*, *Potentilla gracilis*, and *Veratrum californicum* (Manning and Padgett 1995, Rust et al. 2000). Associations dominated by *Equisetum arvense*, *Euthamia occidentalis*, *Solidago* spp., or other species are expected on recently deposited alluvium of river or reservoir banks, especially at low elevations. The emergent *Sparganium emersum* plant association was noted in reservoirs and slow moving streams on the Owyhee Plateau but not sampled (Moseley 1999, Rust et al. 2000). Associations dominated by *Rorippa nasturtium-aquaticum* and *Veronica americana* (or *Veronica anagallis-aquatica*) are expected in spring-fed channels and slow moving canals, streams, or ditches, while *Urtica dioica* patches are expected nearby such sites (Evans 1989, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Oregon Natural Heritage Program 1999, Jankovsky-Jones et al. 2000). Human-induced communities dominated by exotic forbs, such as *Dipsacus sylvestris*, *Lythrum salicaria*, *Melilotus* spp., and *Medicago* spp., have been noted on shorelines of rivers and reservoirs in southwest Idaho (Cole 1995, 1997). Other exotic weedy forbs form dominance types on reservoir drawdown zones, such as *Mollugo verticillata*, *Polygonum* spp., and *Xanthium strumarium* (Jankovsky-Jones et al. 2000).

Aquatic plant associations were not sampled as part of this study. Numerous forb dominated aquatic plant associations have been noted in southwest Idaho (Moseley 1999, Jankovsky-Jones et al. 2000). These include floating leaf types (e.g., dominated by *Azolla mexicana*, *Lemna minor*, *Machaerocarpus californicus*, *Nuphar polysepalum*, *Potamageton* spp., *Ranunculus aquatilis*, and others) and submerged types (e.g. dominated by *Callitriche* spp., *Ceratophyllum demersum*, *Elodea* spp., *Hippuris vulgaris*, *Myriophyllum* spp., *Potamageton pectinatus* (with *Veronica anagallis-aquatica*), and others). A systematic classification of aquatic plant associations is needed for southern Idaho.

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APPENDIX A. PLANTS ENCOUNTERED IN RIPARIAN, WETLAND, AQUATIC, AND EPHEMERAL AREAS WITHIN THE SHADSCALE, SAGEBRUSH-STEPPE, JUNIPER, AND LOWER MONTANE ZONES OF SOUTHWESTERN IDAHO

Compiled by the Conservation Data Center, January 2001

For the most part, nomenclature follows the available Intermountain Flora volumes (Cronquist et al. 1972-1997). Nomenclature for the ferns, fern allies, gymnosperms, and dicots in the subclasses Magnoliidae and Hamamelidae is based on the available Volumes 2 and 3 of the Flora of North America (Flora of North America Editorial Committee 1993,1997). Families missing from these sources follow the nomenclature in Hitchcock and Cronquist (1973). Exceptions are sub-species of *Artemisia tridentata* (formerly referred to as varieties), *Carex utriculata* (formerly referred to as *C. rostrata*, a name now reserved for a strictly boreal species (Reznicek 1987)), and *Grayia spinosa* (formerly referred to as *Atriplex spinosa*). For these taxon, the Jepson Manual (Hickman 1993) is followed. *Artemisia longiloba* is considered a variety of *Artemisia arbuscula* by Cronquist et al. 1994). For the most part, common names come from Hitchcock and Cronquist (1973).

* = non-native species

FERNS AND FERN ALLIES	
AZOLLACEAE / AZOLLA	
Azolla mexicana	water-fern
DENNSTAEDTIACEAE / FERN	
Pteridium aquilinum	bracken fern
DRYOPTERIDACEAE / WOOD FERN	
Athyrium filix-femina	lady-fern
Cysopteris fragilis	brittle bladder fern
EQUISETACEAE / HORSETAIL	
Equisetum arvense	common horsetail
Equisetum hymenale	Dutch scouring rush
Equisetum laevigatum	smooth scouring rush
ISOETACEAE/ QUILLWORT	
Isoetes sp.	quillwort
MARSILEACEAE / CLOVER-FERN	
Marsilea vestita	clover-fern
CONIFERS	
CUPRESSACEAE / CYPRESS	
Juniperus occidentalis	western juniper
Juniperus scopulorum	Rocky Mountain juniper
PINACEAE / PINE	

Pinus ponderosa	ponderosa pine
Pseudotsuga menziesii	Douglas-fir
DICOTS	
ACERACEAE / MAPLE	
Acer glabrum	Rocky Mountain maple
**Acer negundo* var. *violaceum*	Boxelder
**Acer saccharinum*	silver maple
AIZOACEAE / CARPETWEED	
Mollugo verticillata	carpetweed
AMARANTHACEAE / AMARANTH	
**Amaranthus albus*	white pigweed
Amaranthus californicus	California amaranth
Amaranthus powellii	Powell's amaranth
**Amaranthus retroflexus*	rough pigweed
ANACARDIACEAE / SUMAC	
Rhus glabra	smooth sumac
Rhus trilobata	Skunkbush sumac
Toxicodendron rydbergii	western poison-ivy
APIACEAE / CARROT	
Angelica arguta	sharptooth angelica
Angelica kingii	Nevada angelica
**Anthriscus scandicina*	chervil
Berula erecta	cut-leaved water-parsnip
Cicuta douglasii	water-hemlock
Cicuta maculata	spotted water-hemlock
**Conium maculatum*	poison hemlock
Cymopterus longipes	sprawling spring-parsley
Cymopterus petraeus	rock-loving cymopterus
**Daucus carrota*	Queen Anne's lace
Eryngium alismifolium	Modoc eryngo
Heracleum lanatum	cow parsnip
Lomatium cous	cous desert-parsley
Lomatium dissectum var. *multifidum*	fern-leaved desert-parsley
Lomatium grayi	Gray's lomatium
Lomatium leptocarpum	gumbo lomatium
Lomatium macrocarpum	barestem lomatium
Osmorhiza chilensis	Chilean sweet-cicely
Osmorhiza occidentalis	western sweet-cicely
Perideridia bolanderi	Bolander's yampah
Perideridia montana	yampah
Sium suave	water parsnip
APOCYNACEAE / DOGBANE	
Apocynum androsaemifolium	spreading dogbane
Apocynum cannabinum	common dogbane

Apocynum x floribundum	western dogbane
ASCLEPIADACEAE / MILKWEED	
Asclepias fascicularis	narrow-leaved milkweed
Asclepias incarnata	swamp milkweed
Asclepias speciosa	showy milkweed
ASTERACEAE / SUNFLOWER	
Achillea millefolium	yarrow
Agoseris glauca	false dandelion
Agoseris grandiflora	large-flowered agoseris
Agoseris heterophylla	annual agoseris
Ambrosia acanthicarpa	bur ragweed
Ambrosia artemisiifolia	common ragweed
Antennaria dimorpha	low pussy-toes
Antennaria flagellaris	stoloniferous pussy-toes
Antennaria luzuloides	woodrush pussy-toes
Antennaria microphylla	rosy pussy-toes
Antennaria parvifolia	Nuttall's pussy-toes
Antennaria stenophylla	narrow-leaf pussy-toes
**Anthemis arvensis*	dogfennel
**Arctium minus*	common burdock
Arnica chamissonis	meadow arnica
Arnica cordifolia	heartleaf arnica
Arnica fulgens	orange arnica
Arnica longifolia	seep-spring arnica
Arnica sororia	twin arnica
**Artemisia absinthium*	absinthium
**Artemisia annua*	annual wormwood
Artemisia arbuscula	low sagebrush
Artemisia biennis	biennial wormwood
Artemisia cana	silver sagebrush
Artemisia dracunculus	tarragon
Artemisia longiloba	early low sagebrush
Artemisia ludoviciana	western mugwort
Artemisia papposa	Owyhee sagebrush
Artemisia rigida	stiff sagebrush
Artemisia tilesii	Aleutian mugwort
Artemisia tridentata ssp. *tridentata*	basin big sagebrush
Artemisia tridentata ssp. *vaseyana*	mountain big sagebrush
Artemisia tridentata ssp. *wyomingensis*	Wyoming big sagebrush
Aster ascendens	long-leaved aster
Aster brachyactis	rayless alkali aster
Aster eatonii	Eaton's aster
Aster foliaceus	leafy aster
Aster frondosus	short-rayed aster
Aster hesperius	western lined aster
Aster occidentalis	wetern mountain aster
Aster scopulorum	lava aster
Balsamorhiza hookeri	Hooker's balsamroot
Bidens cernua	bur-marigold
Bidens frondosa	leafy beggar-ticks
Bidens vulgata	tall beggar-ticks

Blepharipappus scaber	blepharipappus
Brickellia oblongifolia	narrow-leaved brickellia
**Centaurea cyanus*	blue batchelor buttons
**Centaurea maculosa*	spotted knapweed
**Centaurea repens*	Russian knapweed
Chaenactis douglasii	hoary false-yarrow
**Chondrilla juncea*	rush skeletonweed
Chrysothamnus nauseosus	rubber rabbitbrush
Chrysothamnus viscidiflorus	green rabbitbrush
**Cichorium intybus*	wild succory
**Cirsium arvense*	Canada thistle
Cirsium canovirens	gray-green thistle
Cirsium scariosum	elk thistle
Cirsium subniveum	Jackson Hole thistle
Cirsium utahense	Utah thistle
**Cirsium vulgare*	bull thistle
Conyza canadensis	horseweed
Coreopsis atkinsoniana	Columbia coreopsis
Crepis acuminatum	long-leaved hawksbeard
Crepis occidentalis	western hawksbeard
Erigeron chrysopsidis	dwarf-yellow fleabane
Erigeron divergens	diffuse fleabane
Erigeron lonchophyllus	spear-leaved fleabane
Erigeron philadelphicus	Philadelphia daisy
Erigeron pumilus	shaggy fleabane
Erigeron speciosus	showy fleabane
Erigeron strigosus	branching daisy
Eriophyllum lanatum	woolly sunflower
Euthamia occidentalis	western goldenrod
Gnaphalium chilense	cudweed
Gnaphalium palustre	lowland cudweed
Grindelia squarrosa	curly-cup gumweed
Haplopappus acaulis	stemless goldenweed
Haplopappus hirtus var. *hirtus*	sticky goldenweed
Haplopappus lanceolatus	lance-leaved goldenweed
Haplopappus stenophyllus	goldenweed
Haplopappus uniflorus var. *howellii*	one-flowered goldenweed
Haplopappus uniflorus var. *uniflorus*	one-flowered goldenweed
Helenium autumnale	sneezeweed
Helianthella uniflora	Rocky Mountain helianthella
Helianthus annuus	sunflower
Helianthus nuttallii	Nuttall's sunflower
Iva axillaris	poverty weed
Iva xanthifolia	tall marsh-elder
Lactuca pulchella	blue lettuce
**Lactuca serriola*	prickly lettuce
Machaeranthera canescens	hoary aster
Madia exigua	little tarweed
Madia glomerata	mountain tarweed
Madia gracilis	common tarweed
Microseris nutans	nodding microseris
Microseris troximoides	false-agoseris
**Onopordum acanthium*	Scotch thistle

Psilocarphus brevissimus	dwarf wooly-heads
Psilocarphus oregonus	woolly marbles
Rudbeckia occidentalis	coneflower
Senecio canus	wooly groundsel
Senecio crassulus	thick-leaved groundsel
Senecio hydrophiloides	sweet-marsh butterweed
Senecio hydrophilus	alkali-marsh butterweed
Senecio integerrimus	western groundsel
Senecio pseudaureus	streambank butterweed
Senecio serra	tall butterweed
Senecio streptanthifolius	Rocky Mountain butterweed
Senecio triangularis	arrowhead groundsel
**Senecio vulgaris*	common groundsel
Solidago canadensis	Canada goldenrod
Solidago gigantea	smooth goldenrod
Solidago missouriensis	Missouri goldenrod
**Sonchus asper*	prickly sow-thistle
Stephanomeria paniculata	stiff-branched wirelettuce
**Tanacetum vulgare*	common tansy
**Taraxacum officinale*	dandelion
**Tragopogon dubius*	salsify
Tetradymia canescens	spineless horse-brush
Tetradymia glabrata	little-leaved horse-brush
Wyethia amplexicaulis	northern mule's-ears
Wyethia helianthoides	white-head mule's-ears
**Xanthium strumarium*	common cocklebur
BERBERIDACEAE / BARBERRY	
Berberis repens	creeping Oregongrape
BETULACEAE / BIRCH	
Alnus incana	thin-leaf alder
Alnus rhombifolia	white alder
Alnus rhombifolia x *incana*	white x thinleaf alder hybrid
Betula occidentalis	water birch
BIGNONIACEAE / BIGNONIA	
**Catalpa speciosa*	northern catalpa
BORAGINACEAE / BORAGE	
Amsinckia menziesii	Menzie's fiddleneck
Amsinkia retrorsa	rigid fiddleneck
Amsinckia tessellata	tessellate fiddleneck
**Asperugo procumbens*	madwort
**Cynoglossum officinale*	houndstongue
Hackelia floribunda	many-flowered stickseed
Hackelia micrantha	meadow forget-me-not
Hackelia patens	spotted forget-me-not
Lappula redowskii	western stickseed
**Lithospermum arvense*	corn gromwell
Mertensia ciliata	streamside bluebell
Mertensia oblongifolia	sagebrush bluebell
Myosotis laxa	small-flowered forget-me-not

**Myosotis micrantha*	blue scorpion-grass
Plagiobothrys scouleri	Scouler's popcorn-flower
Plagiobothrys leptocladus	slender-branched popcorn-flower
BRASSICACEAE / MUSTARD	
**Alyssum desertorum*	desert alyssum
Arabis glabra	towermustard
Arabis hirsuta	hairy rockcress
Arabis puburla	hoary rockcress
Barbarea orthoceras	western wintercress
**Brassica* spp.	mustard
**Camelina microcarpa*	hairy falseflax
**Capsella bursa-pastoris*	shepard's purse
Cardamine breweri	Brewer's bittercress
Cardamine oligosperma	little western bittercress
Cardamine pennsylvanica	Pennsylvania bittercress
**Cardaria draba*	hoary whitetop
**Chorispora tenella*	blue mustard
Descurainia pinnata	western tansymustard
Descurainia richardsonii	mountain tansymustard
**Descurainia sophia*	flixweed
**Draba verna*	spring whitlow-grass
Erysimum asperum	prairie rocket
**Lepidium campestre*	pepperwort
Lepidium davisii	Davis' peppergrass
**Lepidium latifolium*	broad-leaved peppergrass
**Lepidium perfoliatum*	clasping pepperweed
Phoenicaulis cheiranthoides	daggerpod
Rorippa calycina	persistentsepal yellowcress
Rorippa curvisiliqua	western yellowcress
Rorippa islandica	marsh yellowcress
**Rorippa nasturtium-aquaticum*	water-cress
Rorippa obtusa	blunt-leaved yellowcress
**Sisymbrium altissimum*	tumblemustard
**Thlaspi arvense*	field pennycress
Thelypodium integrifolium	entireleaved thelypody
CALLITRICHACEAE / WATER-STARWORT	
Callitriche hermaphroditica	autumnal water-starwort
CAMPANULACEAE / HAREBELL	
Downingia bacigalupii	Bacigalupi's downingia
Downingia bicornuta	downingia
Downingia insignis	downingia
Downingia laeta	Great Basin downingia
Heterocodon rariflorum	heterocodon
Porterella carnulosa	porterella
Triodanis perfoliata	Venus-looking-glass
CAPPARACEAE / CAPER	
Cleome lutea	yellow bee plant
CAPRIFOLIACEAE / ELDERBERRY	

Lonicera involucrata	bear honeysuckle
Sambucus cerulea	blue elderberry
Sambucus racemosa	black elderberry
Symphoricarpos albus	common snowberry
Symphoricarpos oreophilus	mountain snowberry
CARYOPHYLLACEAE / PINK	
Arenaria congesta	ballhead sandwort
Arenaria kingii	King's sandwort
Arenaria macrophylla	big-leaf sandwort
**Cerastium viscosum*	sticky chickweed
**Holosteum umbellatum*	jagged chickweed
Sagina saginoides	arctic pearlwort
**Saponaria officinalis*	bouncing bett
**Silene antirrhina*	sleepy catchfly
Silene menziesii	Menzie's silene
Stellaria crispa	crisped starwort
Stellaria longipes	longstalked starwort
**Stellaria media*	chickweed
CERATOPHYLLACEAE / HORNWORT	
Ceratophyllum demersum	hornwort
CHENOPODIACEAE / GOOSEFOOT	
Atriplex canescens	fourwing saltbush
Atriplex confertifolia	shadscale
**Atriplex heterosperma*	orache
Atriplex patula	spear orache
Atriplex rosea	red orache
**Bassia hyssopifolia*	bassia
**Chenopodium album*	lambsquarter
**Chenopodium botrys*	Jerusalem-oak
Chenopodium fremontii	Fremont's goosefoot
Chenopodium glaucum	oakleaf goosefoot
Chenopodium hybridum	maple-leaved goosefoot
Chenododium leptophyllum	slimleaf goosefoot
Chenopodium rubrum	red goosefoot
Grayia spinosa	spiny hopsage
Kochia americana	red sage
**Kochia scoparia*	summer cypress
Monolepsis nuttalliana	patata
Salsola kali	tumbleweed
Sarcobatus vermiculatus	greasewood
Suaeda intermedia	tall seablite
Suaeda occidentalis	slender seabite
CORNACEAE / DOGWOOD	
Cornus sericea	red-osier dogwood
CUCURBITACEAE / CUCUMBER	
Echinocystis lobata	wild cucumber
CUSCUTACEAE / DODDER	

Cuscuta sp.	dodder
DIPSACACEAE / TEASEL	
**Dipsacus sylvestris*	teasel
ELAEAGNACEAE / OLEASTER	
**Elaeagnus angustifolia*	Russian olive
ERICACEAE / HEATH	
Pyrola secunda	one-sided wintergreen
EUPHORBIACEAE / SPURGE	
Chamaesyce serpyllifolia	thyme-leaved spurge
FABACEAE / PEA	
**Amorpha fruticosa*	false indigo
Astragalus calycosus	Torrey's milkvetch
Astragalus canadensis	Canada milkvetch
Astragalus lentiginosus	freckled milkvetch
**Gleditsia triacanthos*	honeylocust
Glycyrrhiza lepidota	American licorice-root
Lotus purshiana	Spanish-clover
**Lotus tenuis*	slender bird's-foot trefoil
Lupinus arbustus	spurred lupine
Lupinus argenteus	silvery lupine
Lupinus brevicaulis	sand lupine
Lupinus lepidus	prairie lupine
**Medicago lupulina*	black medic
**Medicago sativa*	alfalfa
**Meliotus alba*	white sweet-clover
**Meliotus officinalis*	yellow sweet-clover
**Robinia pseudo-acacia*	black locust
Thermopsis rhombifolia	mountain yellowpea
Trifolium cyathiferum	cup clover
**Trifolium dubium*	least hop clover
Trifolium eriocephalum var. *cusickii*	woolly-head clover
**Trifolium fragiferum*	strawberry clover
**Trifolium hybridum*	alsike clover
Trifolium longipes	long-stalked clover
Trifolium macrocephalum	big-head clover
Trifolium microcephalum	maiden clover
**Trifolium pratense*	red clover
**Trifolium repens*	white clover
Trifolium variegatum	white-tip clover
Trifolium wormskjoldii	springbank clover
Vicia americana	American vetch
GENTIANACEAE / GENTIAN	
Centaurium exaltatum	Great Basin centaury
Gentiana affinis	Rocky Mountain gentian
GERANIACEAE / GERANIUM	
**Erodium cicutarium*	filaree

**Geranium carolinianum*	Carolina crane's-bill
Geranium viscosissimum	sticky crane's-bill
GROSSULARIACEAE / CURRANT	
Ribes aureum	golden currant
Ribes cereum	squaw currant
Ribes inerme	whitestem gooseberry
Ribes lacustre	swamp gooseberry
Ribes niveum	snow gooseberry
Ribes oxyacanthoides	Canadian gooseberry
Ribes velutinum	desert gooseberry
HALORAGACEAE / WATER-MILFOIL	
**Myriophyllum brasiliense*	water-milfoil
Myriophyllum spicatum	spiked water-milfoil
HYDROCHARITACEAE / FROG'S-BIT	
Elodea canadensis	Canada waterweed
HYDRANGEACEAE / HYDRANGEA	
Philadelphus lewisii	syringa
HYDROPHYLLACEAE / WATERLEAF	
Hydrophyllum capitatum	waterleaf wooly breeches
Nemophila breviflora	Great Basin nemophila
Nemophila kirtleyi	Snake River Canyon nemophila
Nemophila pedunculata	meadow nemophila
Phacelia hastata	Cordilleran phacelia
Phacelia heterophylla	varileaf phacelia
Phacelia linearis	threadleaf phacelia
Phacelia procera	tall phacelia
Phacelia rattanii	Rattan's phacelia
HYPERICACEAE / ST. JOHN'S-WORT	
Hypericum formosum	western St. John's-wort
**Hypericum perforatum*	Klamath weed
JUGLANDACEAE / WALNUT	
**Juglans nigra*	black walnut
**Juglans regia*	English walnut
LAMIACEAE / MINT	
Agastache urticifolia	nettle-leaf horse-mint
**Lamium amplexicaule*	common dead-nettle
Lycopus americanus	cut-leaved water horehound
Lycopus asper	rough bugleweed
**Marrubium vulgare*	horehound
**Melissa officinalis*	lemon balm
Mentha arvensis	field mint
**Mentha spicata*	spearmint
Monardella odoratissima	monardella
**Nepeta cataria*	catnip
Prunella vulgaris	all-heal

Scutellaria galericulata	marsh skullcap
Scutellaria nana	dwarf skullcap
Stachys palustris	swamp hedge-nettle
Teucrium canadense var. *occidentale*	wood-sage
LINACEAE / FLAX	
Linum lewisii	wild blue flax
LOASACEAE / BLAZING-STAR	
Mentzelia albicaulis	white-stemmed mentzelia
LYTHRACEAE / LOOSESTRIFE	
**Lythrum salicaria*	purple loosestrife
Rotala ramosior	toothcup
MALVACEAE / MALLOW	
Iliamna rivularis	streambank globemallow
**Malva neglecta*	dwarf mallow
Sida hederacea	alkali-mallow
Sidalcea oregana	Oregon checker-mallow
MORACEAE / MULBERRY	
**Morus alba*	mulberry
OLEACEAE / OLIVE	
**Fraxinus pennsylvanica*	green ash
ONAGRACEAE / EVENING-PRIMROSE	
Camissonia pterosperma	wingfruit suncup
Camissonia subacaulis	long-leaf evening-primrose
Camissonia tanacetifolia	tansy-leaf evening-primrose
Chamerion angustifolium	fireweed
Circaea alpina	enchanter's nightshade
Epilobium brachycarpum	panicled willow-herb
Epilobium ciliatum	American willow-herb
Epilobium densiflorum	dense spike-primrose
Epilobium glaberrimum	smooth willow-herb
Epilobium pallidum	pallid spike-primrose
Epilobium pygmaeum	smooth spike-primrose
Epilobium torreyi	stiff spike-primrose
Gaura parviflora	small-flowered gaura
Gayophytum diffusum	spreading groundsmoke
Gayophytum ramosissimum	hairstem groundsmoke
Oenothera elata	western evening-primrose
Oenothera villosa	common evening-primrose
OROBANCHACEAE / BROOMRAPE	
Orobanche corymbosa	flat-topped broomrape
Orobanche fasciculata	clustered broomrape
PLANTAGINACEAE / PLANTAIN	
**Plantago lanceolata*	ribgrass
**Plantago major*	common plantain

Plantago patagonica	Indian wheat
POLEMONIACEAE / PHLOX	
Collomia grandiflora	large-flowered collomia
Collomia linearis	narrow-leaf collomia
Eriastrum sparsiflorum	eriastrum
Gilia aggregata	skyrocket
Gilia leptomeria	sand gilia
Linanthus septentrionalis	northern linanthus
Microsteris gracilis	microsteris
Navarretia intertexta	needle-leaf navarretia
Phlox longifolia	longleaf phlox
POLYGONACEAE / BUCKWHEAT	
Eriogonum caespitosum	mat buckwheat
Eriogonum heracleoides	Wyeth buckwheat
Eriogonum sphaerocephalum	rock buckwheat
Eriogonum vimineum	broom buckwheat
Polygonum amphibium	water smartweed
Polygonum aviculare	prostrate knotweed
Polygonum bistortoides	American bistort
Polygonum coccineum	water smartweed
Polygonum confertiflorum	closeflowered knotweed
**Polygonum convolvulus*	climbing knotweed
Polygonum douglasii	Douglas' knotweed
Polygonum kelloggii	Kellogg's knotweed
**Polygonum hydropiper*	marshpepper smartweed
Polygonum hydropiperoides	common waterpepper
**Polygonum lapathifolium*	curltop ladysthumb
Polygonum persicaria	spotted ladythumb
Polygonum punctatum	water smartweed
Polygonum ramosissimum	bushy knotweed
**Rumex acetosella*	sheep sorrel
**Rumex crispus*	curly dock
Rumex maritimus	golden dock
**Rumex obtusifolius*	bitterdock
Rumex occidentalis	western dock
Rumex paucifolius	mountain sorrel
Rumex salicifolius	narrow-leaved dock
Rumex venosus	veiny dock
PORTULACACEAE / PURSLANE	
Montia chamissoi	water montia
Montia linearis	narrow-leaved montia
Montia perfoliata	miner's lettuce
Portulaca oleracea	common purslane
PRIMULACEAE / PRIMROSE	
Centunculus minimus	chaffweed
Dodecatheon jeffreyi	Jeffrey's shooting-star
Lysimachia ciliata	fringed loosestrife
RANUNCULACEAE / BUTTERCUP	

Aconitum columbianum	Columbian monkshood
Actea rubra	baneberry
Aquilegia formosa	red columbine
Clematis ligusticifolia	western clematis
Delphinium occidentale	western larkspur
Myosurus minimus	least mouse-tail
Ranunculus alismaefolius	water-plantain buttercup
Ranunculus aquatilis	water buttercup
Ranunculus cymbalaria	shore buttercup
Ranunculus inamoenus	unlovely buttercup
**Ranunculus repens*	creeping buttercup
Ranunculus sceleratus	celeryleaved buttercup
Ranunculus testiculatus	bur buttercup
Ranunculus uncinatus	little buttercup
Thalictrum occidentale	western meadowrue
RHAMNACEAE/ BUCKTHORN	
Rhamnus purshiana	cascara
ROSACEAE / ROSE	
Amelanchier alnifolia	western serviceberry
Amelanchier utahensis	Utah serviceberry
Crataegus columbiana	Columbia hawthorne
Crataegus douglasii	black hawthorn
Fragaria vesca	woods strawberry
Fragaria virginiana	Virginia strawberry
Geum macrophyllum	large-leaved avens
Geum triflorum	Prairie smoke
Holodiscus dumosus	gland ocean-spray
Horkelia fusca	horkelia
Ivesia baileyi	Bailey's ivesia
**Malus pumila*	common apple
Pentaphylloides floribunda (syn. *Potenitilla fruticosa*)	shrubby cinquefoil
Physocarpus malvaceus	mallow ninebark
Potentilla anserina	common silverweed
Potentilla biennis	biennial cinquefoil
Potentilla glandulosa	Sticky cinquefoil
Potentilla gracilis	cinquefoil
**Potentilla recta*	erect cinquefoil
Potentilla rivalis	brook cinquefoil
**Prunus armencia*	apricot
**Prunus cerasifera*	cherry plum
Prunus emarginata	bittercherry
Prunus virginiana	common chokecherry
Purshia tridentata	bitterbrush
**Rosa canina*	dog rose
**Rosa eglanteria*	sweetbrier
Rosa woodsii	Wood's rose
**Rubus discolor*	Himalayan blackberry
Rubus idaeus	red raspberry
Rubus leucodermis	blackcap
Rubus parviflorus	thimbleberry
Spiraea betulifolia	white spiraea

RUBIACEAE / MADDER	
Galium aparine	goose-grass cleavers
Galium bifolium	thin-leaf bedstraw
Galium boreale	northern bedstraw
Galium trifidum	small bedstraw
Galium triflorum	fragrant bedstraw
SALICACEAE / WILLOW	
**Populus alba*	silver poplar
**Populus deltoides*	Eastern cottonwood
**Populus fremontii*	Fremont cottonwood
Populus tremuloides	quaking aspen
Populus trichocarpa	black cottonwood
**Salix alba*	golden willow
**Salix alba x fragilis*	European willow
Salix amygdaloides	peach-leaf willow
**Salix babylonica*	weeping willow
Salix bebbiana	Bebb's willow
Salix boothii	Booth's willow
Salix drummondiana	Drummond's willow
Salix exigua	sandbar willow
Salix geyeriana	Geyer's willow
Salix lasiandra var. *caudata*	whiplash willow
Salix lasiolepis	arroyo willow
Salix lemmonii	Lemmon's willow
Salix lutea	yellow willow
Salix scouleriana	Scouler willow
SAXIFRAGACEAE / SAXIFRAGE	
Bolandra oregana	bolandra
Lithophragma glabrum	rock star
Lithophragma parviflorum	small-flowered prairie star
SCROPHULARIACEAE / FIGWORT	
Castilleja applegatei	wavy-leaved paintbrush
Castilleja exilis	annual paintbrush
Castilleja flava	yellow paintbrush
Castilleja miniata	scarlet paintbrush
Castilleja pallescens	palish Indian-paintbrush
Castilleja pilosa	hairy paintbrush
Castilleja sulphurea	sulphur paintbrush
Collinsia parviflora	blue-eyed Mary
Gratiola neglecta	common American hedge hyssop
Limosella aquatica	mudwort
Lindernia dubia	lindernia
Mimulus breweri	Brewer's monkey-flower
Mimulus floribundus	floriferous monkey-flower
Mimulus glabratus	glabrous monkey-flower
Mimulus guttatus	yellow monkey-flower
Mimulus lewisii	Lewis' monkey-flower
Mimulus moschatus	musk-flower
Mimulus nanus	*dwarf monkey-flower*

Mimulus suksdorfii	Suksdorf's monkey-flower
Orthocarpus hispidus	hairy owl-clover
Orthocarpus luteus	yellow owl-clover
Penstemon attenuatus	taper-leaved penstemon
Penstemon confertus	yellow penstemon
Penstemon deustus	hot rock penstemon
Penstemon glandulosa	sticky penstemon
Penstemon humilis	low penstemon
Scrophularia lanceolata	figwort
Tonella floribunda	large-flowered tonella
**Verbascum blattaria*	moth mullein
**Verbascum thapsus*	common mullein
Veronica americana	American brooklime
Veronica anagallis-aquatica	water speedwell
**Veronica arvensis*	common speedwell
Veronica biloba	bilobed speedwell
Veronica peregrina	purslane speedwell
SIMAROUBACEAE / QUASSIA	
**Ailanthus altissima*	tree-of-heaven
SOLANACEAE / NIGHTSHADE	
**Lycium barbarum*	matrimony vine
Nicotiana attenuata	coyote tobacco
Physalis longifolia	long-leaved ground-cherry
**Solanum dulcamara*	climbing nightshade
TAMARICACEAE / TAMARISK	
**Tamarix* spp.	tamarisk
ULMACEAE / ELM	
Celtis reticulata	hackberry
**Ulmus americana*	American elm
**Ulmus pumila*	Siberian elm
URTICACEAE / NETTLE	
Parietaria pensylvanica	pellitory
Urtica dioica	stinging nettle
VALERIANACEAE / VALERIAN	
Plectritis macrocera	plectritis
VERBENACEAE / VERBENA	
Verbena bracteata	bracted verbena
Verbena hastata	blue verbena
VIOLACEAE / VIOLET	
Viola adunca	early blue violet
Viola glabella	stream violet
Viola nuttallii	Nuthall's violet
Viola orbiculata	round-leaved violet

ZYGOPHYLLACEAE / CALTROP	
**Tribulus terrestris*	puncture vine
MONOCOTS	
ALISMATACEAE / WATER-PLANTAIN	
Alisma plantago-aquatica	water-plantain
Machaerocarpus californicus	fringed water-plantain
Sagittaria cuneata	wapato
CYPERACEAE / SEDGE	
Carex amplifolia	big-leaf sedge
Carex aquatilis	water sedge
Carex atherodes	awned sedge
Carex athrostachya	slender-beaked sedge
Carex atrata	blackened sedge
Carex aurea	golden sedge
Carex backii	Back's sedge
Carex bebbii	Bebb's sedge
Carex deweyana	Dewey's sedge
Carex douglasii	Douglas' sedge
Carex filifolia	thread-leaved sedge
Carex hoodii	Hood's sedge
Carex hystricina	porcupine sedge
Carex lanuginosa	woolly sedge
Carex lenticularis	lens sedge
Carex microptera	small-winged sedge
Carex multicostata	many-ribbed sedge
Carex nebrascensis	Nebraska sedge
Carex pachystachya	thick-headed sedge
Carex petasata	Liddon's sedge
Carex praegracilis	clustered field sedge
Carex retrorsa	retrorse sedge
Carex rossii	Ross sedge
Carex sheldonii	Sheldon's sedge
Carex simulata	short-beaked sedge
Carex stipata	sawbeak sedge
Carex subfusca	rusty sedge
Carex utriculata	beaked sedge
Carex vulpinoidea	fox sedge
Cyperus acuminatus	short-pointed flatsedge
Cyperus aristatus	awned flatsedge
Cyperus erythrorhizos	red-rooted flatsedge
Cyperus esculentus	yellow nut-grass
Cyperus rivularis	shining flatsedge
Cyperus strigosus	straw-colored flatsedge
Eleocharis acicularis	needle spike-rush
Eleocharis bella	delicate spike-rush
Eleocharis bolanderi	Bolander's spike-rush
Eleocharis ovata	ovate spike-rush
Eleocharis palustris	common spike-rush

Eleocharis parvula	small spike-rush
Eleocharis pauciflora	few-flowered spike-rush
Eleocharis rostellata	beaked spike-rush
Hemicarpha micrantha	small-flowered hemicarpha
Scirpus acutus	hardstem bulrush
Scirpus americanus	Olney threesquare
Scirpus fluviatilis	river bulrush
Scirpus glauca	hybrid bulrush
Scirpus nevadensis	Nevada bulrush
Scirpus maritimus	seacoast bulrush
Scirpus microcarpus	small-fruit bulrush
Scirpus pallidus	pale bulrush
Scirpus pungens	common threesquare
Scirpus validus	softstem bulrush
IRIDACEAE / IRIS	
Iris missouriensis	western iris
Iris pseudacorus	yellow flag
Sisyrinchium douglasii	grass-widows
JUNCACEAE / RUSH	
Juncus articulatus	jointed rush
Juncus balticus	Baltic rush
Juncus bufonius	toad rush
Juncus confusus	Colorado rush
Juncus effusus	soft rush
Juncus ensifolius	dagger-leaf rush
Juncus filiformis	threadleaf rush
Juncus longistylis	long-styled rush
Juncus nevadensis	Sierra rush
Juncus orthophyllus	straight-leaved rush
Juncus tenuis	slender rush
Juncus torreyi	Torrey's rush
Luzula campestris	field woodrush
JUNCAGINACEAE / ARROWGRASS	
Lilaea scilloides	flowering quillwort
Triglochin concinnum	graceful arrow-grass
Triglochin maritimum	seaside arrow-grass
Triglochin palustre	marsh arrow-grass
LEMNACEAE / DUCKWEED	
Lemna minor	duckweed
LILIACEAE / LILY	
Allium acuminatum	tapertip onion
Allium lemmonii	Lemmon's onion
Brodiaea douglasii	Douglas' brodiaea
**Asparagus officinalis*	asparagus
Calochortus macrocarpus	sagebrush mariposa
Camassia cusickii	Cusick's camas
Camassia quamash	blue camas
Disporum trachycarpum	Sierra fairybell

Fritillaria atropurpurea	chocolate lily
Smilacina racemosa	western Solomon-plume
Smilacina stellata	starry Solomon-plume
Trillium petiolatum	purple trillium
Veratrum californicum	false hellebore
Zigadenus venenosus	meadow death camas
ORCHIDACEAE / ORCHID	
Habenaria dilatata	bog-candle
Habenaria unalascensis	Alaska rein-orchid
Epipactis gigantea	giant helleborine
POACEAE / GRASS	
**Agropyron cristatum*	crested wheatgrass
Agropyron spicatum	bluebunch wheatgrass
Agropyron dasystachyum	thickspike wheatgrass
**Agropyron elongatum*	tall wheatgrass
**Agropyron intermedium*	intermediate wheatgrass
**Agropyron repens*	quackgrass
Agropyron smithii	western wheatgrass
Agropyron trachycaulum	slender wheatgrass
Agrostis exarata	spike bentgrass
Agrostis scabra	ticklegrass
**Agrostis stolonifera*	redtop bentgrass
Alopecurus aequalis	little foxtail
Alopecurus carolinianus	Carolina foxtail
**Alopecurus geniculatus*	water foxtail
**Alopecurus pratensis*	meadow foxtail
**Apera interrupta*	interrupted apera
Aristida purpurea	red threeawn
Beckmannia syzigachne	American sloughgrass
**Bromus brizaeformis*	rattlesnake brome
Bromus carinatus	mountain brome
**Bromus inermis*	smooth brome
**Bromus japonicus*	Japanese chess
**Bromus tectorum*	cheatgrass
**Dactylis glomerata*	orchardgrass
Calamagrostis canadensis	bluejoint reedgrass
Calamagrostis neglecta	slimstem reedgrass
Calamagrostis rubescens	pinegrass
Catabrosa aquatica	brookgrass
**Cenchrus longispinus*	sandbur
**Crypsis alopecuroides*	crypsis
Dactylis glomerata	orchard grass
Danthonia californica	California oatgrass
Danthonia intermedia	timber oatgrass
Deschampsia cespitosa	tufted hairgrass
Deschampsia danthonioides	annual hairgrass
Deschampsia elongata	slender hairgrass
Dichanthelium lanuginosum	western witchgrass
Dichanthelium oligosanthes	Scribner witchgrass
Distichlis spicata var. *stricta*	interior saltgrass
Echinochloa crus-galli	barnyard grass

Elymus canadensis	Canada wildrye
Elymus cinereus	basin wildrye
Elymus glaucus	blue wildrye
Elymus triticoides var. *triticoides*	creeping wildrye
**Eragrostis cilianensis*	stinkgrass
Eragrostis hypnoides	creeping lovegrass
Eragrostis lutescens	yellow lovegrass
Eragrostis pectinacea	purple eragrostis
**Festuca arundinacea*	tall fescue
Festuca idahoensis	Idaho fescue
**Festuca pratensis*	meadow fescue
Glyceria borealis	northern mannagrass
Glyceria elata	tall mannagrass
Glyceria grandis	American mannagrass
Glyceria striata	fowl mannagrass
**Holcus lanatus*	common velvetgrass
Hordeum brachyantherum	meadow barley
Hordeum jubatum	foxtail barley
Koeleria nitida	junegrass
Leersia oryzoides	rice cutgrass
Leptochloa fascicularis	loose-flowered sprangletop
Muhlenbergia asperifolia	scratchgrass muhly
Muhlenbergia minutissima	annual muhly
Muhlenbergia mexicana	leafy muhly
Muhlenbergia richardsonis	mat muhly
Oryzopsis hymenoides	Indian ricegrass
Panicum capillare	old witchgrass
**Panicum millaceum*	broom corn millet
Paspalum distichum	knotgrass
Phalaris arundinacea	reed canarygrass
**Phleum pratense*	timothy
Phragmites australis	common reed
Poa annua	annual bluegrass
Poa agassizensis	bluegrass
**Poa bulbosa*	bulbous bluegrass
Poa canbyi	Canby bluegrass
Poa compressa	Canada bluegrass
Poa glaucifolia	pale-leaved bluegrass
Poa interior	inland bluegrass
Poa juncifolia	alkali bluegrass
Poa nevadensis	Nevada bluegrass
**Poa palustris*	fowl bluegrass
**Poa pratensis*	Kentucky bluegrass
Poa secunda	Sandberg's bluegrass
**Polypogon monospeliensis*	rabbitfoot grass
Puccinellia lemmonii	Lemmon's alkaligrass
Puccinellia nuttalliana	Nuttall's alkaligrass
Puccinellia pauciflora	weak alkaligrass
**Sclerochloa dura*	hardgrass
**Secale cereale*	Cereal rye
**Setaria glauca*	foxtail
Sitanion hystrix	squirreltail
Spartina gracilis	alkali cordgrass

Sporobolus airoides	alkali sacaton
Sporobolus cryptandrus	sand dropseed
Stipa columbiana	Columbia needlegrass
Stipa comata	needle-and-thread
Stipa occidentalis	western needlegrass
Stipa thurberiana	Thurber's needlegrass
Stipa webberi	Webber needlegrass
**Taeniatherum caput-medusae*	medusahead wildrye
**Triticum aestivum*	wheat
**Ventenata dubia*	ventenata
Vulpia myuros	rat-tail fescue
POTAMOGETONACEAE / PONDWEED	
Potamogeton diversifolius	diverse-leaved pondweed
Potamogeton foliosus	close-leaved pondweed
Potamogeton gramineus	grass-leaved pondweed
Potamogeton natans	floating-leaved pondweed
Potamogeton nodosus	long-leaved pondweed
Potamogeton pectinatus	fennel-leaved pondweed
Potamogeton pusillus	small pondweed
SPARGANIACEAE / BURREED	
Sparganium angustifolium	narrowleaf bur-reed
Sparganium emersum	simplestem bur-reed
TYPHACEAE / CATTAIL	
Typha latifolia	cat-tail
ZANNICHELLIACEAE / HORNED PONDWEED	
Zannichellia palustris	horned pondweed

APPENDIX B. LIST OF PLANT ASSOCIATIONS AND ACRONYMS USED IN APPENDIX C.

Associations	Code
Alnus rhombifolia/Philadelphus lewisii	ALRH2/PHLE4
Populus tremuloides/Cornus sericea	POTR5/COST4
Populus trichocarpa/Rosa woodsii	POTR15/ROWO
Populus trichocarpa/Salix lasiandra	POTR15/SALAC
Populus trichocarpa/Salix lutea	POTR15/SALU2
Populus trichocarpa/Symphoricarpos albus	POTR15/SYAL
Populus trichocarpa/Acer glabrum	POTR15/ACGL
Juniperus occidentalis ephemeral drainage (T)	JUOC EPH
Juniperus scopulorum/Elymus glaucus	JUSC2/ELGL
Juniperus scopulorum/Equisetum (arvense, hyemale) (T)	JUSC2/EQSP
Pseudotsuga menziesii/Acer glabrum-Physocarpus malvaceus Flood Plain	PSME/ACGL-PHMA5
Pseudotsuga menziesii/Cornus sericea	PSME/COST4
Betula occidentalis/Cornus sericea	BEOC2/COST4
Betula occidentalis/Mesic forb	BEOC2/MEFO
Betula occidentalis/Philadelphus lewisii	BEOC2/PHLE4
Betula occidentalis/Poa pratensis c.t.	BEOC2/POPR
Crataegus douglasii/Rosa woodsii	CRDO2/ROWO
Cornus sericea	COST4
Philadelphus lewisii	PHLE4
Prunus virginiana d.t.	PRVI
Prunus virginiana/Elymus glaucus	PRVI/ELGL
Rhus trilobata	RHTR
Salix exigua/Barren	SAEX/BARREN
Salix exigua/Mesic graminoid	SAEX/MEGR
Salix geyeriana/Carex utriculata	SAGE2/CAUTR
Salix geyeriana/Mesic Forb	SAGE2/MEFO
Salix lasiandra/Bench	SALAC/BENCH
Salix lasiandra/Cornus sericea	SALAC/COST4
Salix lasiolepis d.t.	SALA6
Salix lasiolepis/Barren	SALA6/BARREN
Salix lemmonii/Bench	SALE/BENCH
Salix lutea/Rosa woodsii	SALU2/ROWO
Artemisia cana/Dry graminoid	ARCA13/DRYGRAM
Artemisia cana/Festuca idahoensis	ARCA13/FEID
Artemisia cana/Muhlenbergia richardsonis	ARCA13/MURI
Artemisia papposa	ARPA16
Artemisia tridentata ssp. *tridentata/Elymus cinereus*	ARTRT/ELCI2
Sarcobatus vermiculatus/Distichlis spicata	SAVE4/DISP
Sarcobatus vermiculatus/Poa secunda (T)	SAVE4/POSE
Carex nebrascensis	CANE2
Carex simulata	CASI2
Danthonia californica	DACA3

Associations	Code
Eleocharis palustris lotic	ELPA3 (LOTIC)
Eleocharis palustris vernal pool	ELPA3 (LENTIC)
Eleocharis rostellata	ELRO2
Glyceria grandis	GLGR
Hordeum brachyantherum	HOBR2
Juncus balticus	JUBA
Phragmites australis	PHAU7
Scirpus americanus	SCAML
Scirpus pungens	SCPU3
Artemisia ludoviciana	ARLU
Berula erecta (T)	BEER
Camassia cusickii	CACU2
Lepidium davisii vernal pool	LEDA2

APPENDIX C. CONSTANCY AND AVERAGE CANOPY COVER OF SPECIES

ALNUS RHOMBIFOLIA AND POPULUS TREMULOIDES ALLIANCES

CON=% of plots where species occurred
COVER=average cover in all plots

# PLOTS	ALRH2/PHLE4 n=5		POTR5/COST4 n=1	
SPECIES	CON	COVER	CON	COVER
TREES				
Alnus rhombifolia	100	85.6	0	0.0
Celtis reticulata	20	0.2	0	0.0
Morus alba	20	6.0	0	0.0
Populus tremuloides	0	0.0	100	40.0
Robinia pseudo-acacia	20	2.0	0	0.0
SHRUBS				
Clematis ligusticifolia	100	4.6	0	0.0
Cornus sericea	40	10.0	100	50.0
Crataegus douglasii	40	0.8	100	40.0
Philadelphus lewisii	100	10.6	0	0.0
Rhus glabra	20	0.2	0	0.0
Ribes aureum	40	0.4	0	0.0
Rosa woodsii	20	0.2	0	0.0
Salix lasiolepis	40	4.0	0	0.0
Salix lutea	20	2.0	100	3.0
Symphoricarpos albus	20	0.2	0	0.0
Toxicodendron rydbergii	20	4.0	0	0.0
FORBS				
Anthriscus scandicina	20	0.6	0	0.0
Artemisia tilesii	20	0.2	0	0.0
Asperugo procumbens	20	0.6	0	0.0
Collomia grandiflora	20	0.2	0	0.0
Collomia linearis	20	0.2	0	0.0
Conium maculatum	20	0.2	0	0.0
Epilobium ciliatum	20	0.2	0	0.0
Galium aparine	20	0.6	100	1.0
Geum macrophyllum	20	0.2	0	0.0
Helianthus annuus	20	0.2	0	0.0
Lactuca serriola	40	0.4	100	1.0
Medicago lupulina	20	0.2	0	0.0
Mentha arvensis	20	0.2	0	0.0
Mimulus guttatus	40	0.4	0	0.0
Montia perfoliata	20	0.2	0	0.0
Nepeta cataria	20	0.6	0	0.0
Osmorhiza chilensis	0	0.0	100	1.0
Plantago major	20	0.2	0	0.0
Polygonum convolvulus	20	0.2	0	0.0
Polygonum sp.	40	0.4	0	0.0
Rorippa nasturtium-aquaticum	20	0.6	0	0.0
Rumex crispus	20	0.2	0	0.0
Sisymbrium altissimum	20	0.2	0	0.0
Stellaria media	20	0.2	0	0.0
Tragopogon dubius	0	0.0	100	1.0
Urtica dioica	20	0.2	100	1.0
Veronica anagallis-aquatica	20	0.6	0	0.0
FERNS AND FERN ALLIES				
Equisetum hyemale	40	4.6	0	0.0
GRAMINOIDS				
Bromus japonicus	20	0.2	100	1.0
Elymus glaucus	100	1.8	0	0.0
Bromus brizaeformis	0	0.0	100	1.0

	ALRH2/PHLE4		POTR5/COST4	
Poa bulbosa	60	1.0	0	0.0
Bromus tectorum	40	0.4	0	0.0
Carex amplifolia	20	0.2	0	0.0
Deschampsia elongata	20	0.2	0	0.0
Glyceria elata	20	0.2	0	0.0
Poa pratensis	20	0.2	0	0.0
Polypogon monspeliensis	20	0.2	0	0.0
Scirpus microcarpus	20	0.2	0	0.0

POPULUS TRICHOCARPA ALLIANCE

# PLOTS	POTR15/ROWO n=4		POTR15/SALAC n=3		POTR15/SALU2 n=1		POTR15/SYAL n=1		POTR15/ ACGL n=1	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
TREES										
Populus trichocarpa	100	57.0	100	53.3	100	50.0	100	40.0	100	90.0
SHRUBS										
Acer glabrum	25	0.3	0	0.0	0	0.0	0	0.0	100	60.0
Alnus incana	0	0.0	33	1.7	100	3.0	100	10.0	0	0.0
Amelanchier alnifolia	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia tridentata ssp. vaseyana	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Betula occidentalis	0	0.0	0	0.0	0	0.0	100	10.0	0	0.0
Chrysothamnus nauseosus	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Clematis ligusticifolia	50	7.5	100	1.7	100	1.0	100	1.0	100	1.0
Cornus sericea	25	5.0	33	3.3	100	3.0	0	0.0	100	10.0
Philadelphus lewisii	50	5.3	67	2.7	0	0.0	100	20.0	100	10.0
Prunus virginiana	50	1.0	0	0.0	0	0.0	100	10.0	0	0.0
Ribes aureum	75	1.3	67	0.7	100	3.0	0	0.0	0	0.0
Ribes inerme	0	0.0	0	0.0	100	10.0	0	0.0	0	0.0
Rosa woodsii	100	36.0	0	0.0	100	3.0	0	0.0	0	0.0
Rubus idaeus	25	0.3	0	0.0	100	30.0	100	5.0	0	0.0
Salix exigua	25	0.3	33	3.3	0	0.0	0	0.0	0	0.0
Salix geyeriana	0	0.0	0	0.0	100	10.0	0	0.0	0	0.0
Salix lasiandra var. caudata	25	0.8	100	40.0	100	10.0	0	0.0	0	0.0
Salix lasiolepis	25	0.3	33	6.7	0	0.0	0	0.0	0	0.0
Salix lutea	25	0.8	0	0.0	100	60.0	0	0.0	0	0.0
Sambucus cerulea	50	5.8	0	0.0	100	1.0	100	5.0	0	0.0
Symphoricarpos albus	0	0.0	0	0.0	0	0.0	100	20.0	100	40.0
Toxicodendron rydbergii	50	1.0	0	0.0	0	0.0	0	0.0	0	0.0
FORBS										
Achillea millefolium	25	0.3	0	0.0	0	0.0	100	1.0	0	0.0
Alyssum desertorum	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Angelica arguta	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Arabis glabra	0	0.0	0	0.0	100	1.0	100	1.0	0	0.0
Arctium minus	25	0.3	0	0.0	100	1.0	0	0.0	100	1.0
Arnica cordifolia	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Artemisia ludoviciana	25	0.3	33	0.3	0	0.0	0	0.0	0	0.0
Asperugo procumbens	50	15.0	0	0.0	0	0.0	0	0.0	100	1.0
Aster sp.	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Cerastium viscosum	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Cirsium arvense	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Cirsium vulgare	0	0.0	33	0.3	100	1.0	0	0.0	0	0.0
Collomia grandiflora	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Collomia linearis	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Conium maculatum	50	1.0	0	0.0	0	0.0	0	0.0	100	1.0
Cynoglossum officinale	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Epilobium brachycarpum	25	0.3	33	0.3	0	0.0	0	0.0	0	0.0
Galium aparine	75	3.5	33	0.3	0	0.0	0	0.0	100	60.0
Galium triflorum	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Geranium carolinianum	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Geum macrophyllum	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Grindelia squarrosa	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Hackelia floribunda	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Helianthus annuus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Heracleum lanatum	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Hydrophyllum capitatum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Hypericum perforatum	0	0.0	67	0.7	0	0.0	0	0.0	0	0.0
Lactuca serriola	75	1.3	67	0.7	0	0.0	0	0.0	0	0.0

	POTR15/ROWO		POTR15/SALAC		POTR15/SALU2		POTR15/SYAL		POTR15/ ACGL	
Lithospermum arvense	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Lomatium dissectum var. multifidum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Medicago lupulina	50	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Melilotus officinalis	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Mimulus guttatus	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Montia perfoliata	50	2.8	0	0.0	0	0.0	0	0.0	100	1.0
Nemophila kirtleyi	50	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Onopordum acanthium	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Osmorhiza chilensis	25	0.8	0	0.0	0	0.0	0	0.0	100	3.0
Penstemon glandulosus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Polygonum douglasii	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Potentilla rivalis	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Ranunculus cymbalaria	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Ranunculus uncinatus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Rorippa nasturtium-aquaticum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Rumex crispus	75	1.8	0	0.0	0	0.0	0	0.0	0	0.0
Rumex salicifolius	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Silene menziesii	25	0.3	0	0.0	100	1.0	0	0.0	0	0.0
Sisymbrium altissimum	25	0.3	0	0.0	0	0.0	0	0.0	100	1.0
Smilacina stellata	0	0.0	0	0.0	100	1.0	100	1.0	100	3.0
Solidago missouriensis	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Sonchus asper	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Stellaria media	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Stellaria sp.	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Taraxacum officinale	50	0.5	33	0.3	0	0.0	0	0.0	100	1.0
Thermopsis rhombifolia	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Tragopogon dubius	25	0.3	33	0.3	0	0.0	100	1.0	100	1.0
Trifolium repens	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Urtica dioica	25	0.8	0	0.0	100	1.0	0	0.0	100	1.0
Verbascum thapsus	0	0.0	0	0.0	100	1.0	100	1.0	0	0.0
Veronica anagallis-aquatica	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Vicia americana	0	0.0	33	0.3	0	0.0	100	1.0	0	0.0
Viola adunca	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
FERNS AND FERN ALLIES										
Equisetum arvense	50	7.8	0	0.0	0	0.0	0	0.0	0	0.0
Equisetum hyemale	0	0.0	33	10.0	100	1.0	100	1.0	0	0.0
Equisetum laevigatum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
GRAMINOIDS										
Agrostis stolonifera	25	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Bromus japonicus	75	1.8	0	0.0	0	0.0	100	1.0	0	0.0
Bromus tectorum	75	0.8	33	0.3	0	0.0	100	1.0	0	0.0
Carex athrostachya	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Carex lanuginosa	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Carex microptera	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Eleocharis palustris	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Elymus glaucus	50	1.0	100	8.0	100	1.0	100	70.0	0	0.0
Hordeum jubatum	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Leersia oryzoides	25	2.5	0	0.0	0	0.0	0	0.0	0	0.0
Poa bulbosa	75	7.8	67	0.7	0	0.0	0	0.0	0	0.0
Poa compressa	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Poa pratensis	75	13.3	33	6.7	100	1.0	100	10.0	0	0.0
Sitanion hystrix var hordeoides	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0

JUNIPERUS OCCIDENTALIS, JUNIPERUS SCOPULORUM AND PSEUDOTSUGA MENZIESII ALLIANCES

# PLOTS	JUOC EPH. n=3		JUSC2/ELGL n=3		JUSC2/EQSP n=2		PSME/ACGL n=1		PSME/COST4 n=1	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
TREES										
Juniperus occidentalis	100	53.3	0	0.0	0	0.0	0	0.0	0	0.0
Juniperus scopulorum	0	0.0	100	76.7	100	70.0	0	0.0	0	0.0
Populus tremuloides	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Populus trichocarpa	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Pseudotsuga menziesii	33	3.3	0	0.0	0	0.0	100	80.0	100	30.0
SHRUBS										
Acer glabrum	33	1.0	0	0.0	0	0.0	100	30.0	100	10.0
Amelanchier alnifolia	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0
Artemisia arbuscula	67	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia cana	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia tridentata ssp. vaseyana	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Berberis repens	0	0.0	67	3.7	50	0.5	0	0.0	0	0.0
Clematis ligusticifolia	33	0.3	67	4.3	50	1.5	0	0.0	0	0.0
Cornus sericea	0	0.0	0	0.0	50	1.5	0	0.0	100	80.0
Philadelphus lewisii	33	3.3	0	0.0	0	0.0	100	1.0	0	0.0
Physocarpus malvaceus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Rhamnus purshiana	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0
Ribes aureum	0	0.0	0	0.0	50	0.5	0	0.0	100	1.0
Ribes inerme	0	0.0	33	0.3	50	0.5	0	0.0	0	0.0
Rosa woodsii	33	0.3	100	1.0	50	1.5	0	0.0	0	0.0
Rubus idaeus	0	0.0	0	0.0	50	1.5	0	0.0	0	0.0
Rubus parviflorus	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0
Salix lutea	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Salix scouleriana	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Symphoricarpos albus	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Symphoricarpos oreophilus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Toxicodendron rydbergii	0	0.0	33	1.0	0	0.0	0	0.0	0	0.0
FORBS										
Achillea millefolium	67	0.7	0	0.0	50	0.5	0	0.0	0	0.0
Agoseris sp.	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Angelica arguta	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Antennaria luzuloides	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Antennaria parvifolia	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Aquilegia formosa	33	0.3	0	0.0	50	0.5	100	1.0	0	0.0
Arabis glabra	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Arctium sp.	0	0.0	33	1.0	0	0.0	0	0.0	0	0.0
Arenaria congesta	67	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia ludoviciana	33	0.3	33	0.3	50	0.5	0	0.0	0	0.0
Asperugo procumbens	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Aster ascendens	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Barbarea orthoceras	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Cerastium viscosum	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Chenopodium album	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Circaea alpina	0	0.0	0	0.0	0	0.0	100	20.0	100	3.0
Cirsium arvense	0	0.0	33	1.0	50	0.5	0	0.0	0	0.0
Cirsium vulgare	33	0.3	0	0.0	50	0.5	0	0.0	0	0.0
Descurainia sophia	0	0.0	33	0.3	0	0.0	100	1.0	0	0.0
Chamerion angustifolium	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Epilobium brachycarpum	67	0.7	33	0.3	50	0.5	0	0.0	0	0.0
Galium aparine	0	0.0	0	0.0	0	0.0	100	3.0	100	3.0
Galium triflorum	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Geranium viscosissimum	0	0.0	33	0.3	100	2.0	0	0.0	0	0.0
Geum macrophyllum	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0

	JUOC EPH.		JUSC2/ELGL		JUSC2/EQSP		PSME/ACGL		PSME/COST4	
Glycyrrhiza lepidota	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Haplopappus uniflorus var. howellii	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Haplopappus uniflorus var. uniflorus	67	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Lactuca serriola	67	0.7	33	0.3	0	0.0	100	1.0	0	0.0
Lithophragma parviflorum	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Lomatium nudicaule	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Mentha arvensis	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Montia perfoliata	33	0.3	0	0.0	0	0.0	100	3.0	0	0.0
Oenothera villosa	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Pyrola secunda	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Osmorhiza chilensis	33	0.3	33	0.3	0	0.0	100	40.0	100	1.0
Penstemon deustus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Penstemon glandulosus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Perideridia montana	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Potentilla glandulosa	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Rumex crispus	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Senecio pseudareus	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Senecio serra	0	0.0	0	0.0	50	5.0	0	0.0	0	0.0
Senecio streptanthifolius	0	0.0	0	0.0	50	1.5	0	0.0	0	0.0
Silene menziesii	0	0.0	67	1.3	100	1.0	0	0.0	0	0.0
Sisymbrium altissimum	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Smilacina stellata	0	0.0	100	7.7	100	5.5	100	10.0	0	0.0
Solidago missouriensis	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Stellaria media	0	0.0	0	0.0	0	0.0	100	50.0	0	0.0
Taraxacum officinale	33	0.3	33	0.3	0	0.0	0	0.0	0	0.0
Thermopsis rhombifolia	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Tragopogon dubius	33	0.3	33	0.3	0	0.0	0	0.0	0	0.0
Trifolium macrocephalum	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Trifolium repens	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Urtica dioica	33	0.3	0	0.0	50	0.5	100	10.0	0	0.0
Verbascum thapsus	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Veronica peregrina	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Viola glabella	0	0.0	0	0.0	0	0.0	100	3.0	0	0.0
Viola sp.	0	0.0	33	0.3	50	0.5	0	0.0	0	0.0
Wyethia amplexicaulis	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
FERNS AND FERN ALLIES										
Cystopteris fragilis	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Equisetum arvense	0	0.0	0	0.0	50	25.0	0	0.0	0	0.0
Equisetum hyemale	0	0.0	67	0.7	100	35.5	0	0.0	0	0.0
GRAMINOIDS										
Elymus glaucus	33	13.3	67	4.3	50	0.5	100	1.0	100	1.0
Poa pratensis	33	6.7	67	1.3	100	15.5	100	1.0	0	0.0
Poa nevadensis	67	4.3	67	2.0	50	0.5	0	0.0	0	0.0
Festuca idahoensis	67	10.0	33	3.3	50	0.5	0	0.0	0	0.0
Elymus cinereus	0	0.0	67	0.7	100	1.0	0	0.0	0	0.0
Bromus carinatus	0	0.0	0	0.0	50	0.5	0	0.0	100	1.0
Bromus tectorum	67	3.7	67	0.7	0	0.0	0	0.0	0	0.0
Carex rossii	0	0.0	33	1.0	100	1.0	0	0.0	0	0.0
Carex lanuginosa	0	0.0	33	0.3	100	1.0	0	0.0	0	0.0
Glyceria elata	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Agropyron smithii	67	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Eleocharis palustris	67	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Bromus inermis	0	0.0	33	3.3	0	0.0	0	0.0	0	0.0
Dactylis glomerata	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Phleum pratense	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Carex douglasii	33	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Poa bulbosa	33	3.3	0	0.0	0	0.0	0	0.0	0	0.0

	JUOC EPH.		JUSC2/ELGL		JUSC2/EQSP		PSME/ACGL		PSME/COST4	
Poa secunda	0	0.0	33	1.0	0	0.0	0	0.0	0	0.0
Danthonia californica	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Sitanion hystrix var hordeoides	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Stipa occidentalis	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0
Agrostis stolonifera	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Bromus japonicus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Deschampsia danthonioides	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Hordeum brachyantherum	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Juncus balticus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Koeleria nitida	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0

BETULA OCCIDENTALIS ALLIANCE

# PLOTS	BEOC2/COST4 n=2		BEOC2/MEFO n=2		BEOC2/PHLE4I n=1		BEOC/POPR n=1	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER
TREES								
Celtis reticulata	0	0.0	0	0.0	0	0.0	100	1.0
Juniperus occidentalis	0	0.0	50	0.5	0	0.0	0	0.0
Salix amygdaloides	0	0.0	0	0.0	0	0.0	100	3.0
SHRUBS								
Acer glabrum	0	0.0	50	5.0	0	0.0	0	0.0
Alnus incana	50	10.0	0	0.0	0	0.0	100	10.0
Amelanchier alnifolia	0	0.0	50	0.5	0	0.0	0	0.0
Betula occidentalis	100	85.0	100	94.0	100	98.0	100	60.0
Clematis ligusticifolia	50	0.5	100	5.5	0	0.0	100	3.0
Cornus sericea	100	25.0	50	5.0	0	0.0	100	3.0
Crataegus douglasii	0	0.0	50	5.0	0	0.0	0	0.0
Philadelphus lewisii	100	10.0	50	0.5	100	20.0	0	0.0
Prunus virginiana	50	0.5	0	0.0	0	0.0	0	0.0
Purshia tridentata	0	0.0	0	0.0	0	0.0	100	1.0
Ribes aureum	0	0.0	50	0.5	0	0.0	100	3.0
Ribes sp.	0	0.0	0	0.0	0	0.0	100	1.0
Rosa eglanteria	0	0.0	0	0.0	0	0.0	100	10.0
Rosa woodsii	0	0.0	50	1.5	100	1.0	0	0.0
Rubus idaeus	50	0.5	0	0.0	0	0.0	0	0.0
Rubus parviflorus	50	1.5	0	0.0	0	0.0	0	0.0
Salix lasiandra var. caudata	50	10.0	0	0.0	0	0.0	0	0.0
Sambucus cerulea	0	0.0	50	0.5	0	0.0	0	0.0
Symphoricarpos albus	50	0.5	0	0.0	0	0.0	0	0.0
Toxicodendron rydbergii	50	0.5	50	20.0	100	20.0	0	0.0
FORBS								
Achillea millefolium	0	0.0	50	0.5	0	0.0	0	0.0
Apocynum cannabinum	0	0.0	50	0.5	100	1.0	0	0.0
Arenaria macrophylla	0	0.0	50	0.5	0	0.0	0	0.0
Circaea alpina	50	0.5	0	0.0	0	0.0	100	1.0
Cirsium arvense	0	0.0	50	0.5	100	1.0	0	0.0
Cirsium vulgare	0	0.0	50	0.5	0	0.0	0	0.0
Epilobium ciliatum	50	0.5	0	0.0	0	0.0	0	0.0
Galium aparine	50	0.5	50	1.5	0	0.0	0	0.0
Galium triflorum	0	0.0	0	0.0	0	0.0	100	1.0
Heracleum lanatum	50	0.5	0	0.0	0	0.0	0	0.0
Lactuca serriola	0	0.0	50	0.5	0	0.0	0	0.0
Lemna minor	0	0.0	50	0.5	0	0.0	0	0.0
Medicago lupulina	0	0.0	50	0.5	0	0.0	0	0.0
Melilotus officinalis	0	0.0	50	0.5	0	0.0	0	0.0
Montia perfoliata	0	0.0	50	0.5	0	0.0	0	0.0
Nepeta cataria	0	0.0	50	0.5	0	0.0	0	0.0
Onopordum acanthium	0	0.0	50	0.5	0	0.0	0	0.0
Osmorhiza chilensis	50	0.5	50	5.0	0	0.0	0	0.0
Polygonum hydropiperoides	0	0.0	0	0.0	0	0.0	100	1.0
Rumex crispus	50	0.5	0	0.0	0	0.0	0	0.0
Rumex occidentalis	0	0.0	0	0.0	0	0.0	100	1.0
Smilacina racemosa	50	0.5	0	0.0	0	0.0	0	0.0
Smilacina stellata	50	1.5	100	15.0	0	0.0	0	0.0
Solanum dulcamara	0	0.0	50	0.5	100	1.0	100	1.0
Solidago missouriensis	0	0.0	50	0.5	0	0.0	0	0.0
Taraxacum officinale	0	0.0	50	0.5	0	0.0	0	0.0
Tragopogon dubius	0	0.0	50	0.5	0	0.0	0	0.0
Trillium petiolatum	50	0.5	50	0.5	0	0.0	0	0.0

	BEOC2/COST4		BEOC2/MEFO		BEOC2/PHLE4I		BEOC/POPR	
Urtica dioica	50	0.5	100	1.0	0	0.0	0	0.0
Verbascum thapsus	0	0.0	100	1.0	0	0.0	100	1.0
Veronica anagallis-aquatica	50	0.5	0	0.0	0	0.0	100	1.0
Veronica biloba	0	0.0	50	0.5	0	0.0	0	0.0
FERNS AND FERN ALLIES								
Equisetum arvense	0	0.0	0	0.0	0	0.0	100	1.0
Equisetum hyemale	50	0.5	0	0.0	0	0.0	0	0.0
GRAMINOIDS								
Carex amplifolia	0	0.0	0	0.0	100	1.0	0	0.0
Elymus glaucus	100	1.0	100	2.0	100	3.0	0	0.0
Glyceria elata	0	0.0	0	0.0	100	1.0	0	0.0
Poa bulbosa	0	0.0	50	0.5	0	0.0	0	0.0
Poa pratensis	0	0.0	50	5.0	0	0.0	100	40.0

CRATAEGUS DOUGLASII, CORNUS SERICEA, AND PHILADELPHUS LEWISII ALLIANCES

# PLOTS	CRDO2/ROWO n=7		COST4 n=3		PHLE4 n=3	
SPECIES	CON	COVER	CON	COVER	CON	COVER
TREES						
Salix amygdaloides	0	0.0	0	0.0	33	1.0
SHRUBS						
Acer glabrum	0	0.0	0	0.0	33	6.7
Amelanchier alnifolia	43	0.4	0	0.0	33	0.3
Artemisia rigida	14	0.1	0	0.0	0	0.0
Artemisia tridentata ssp. tridentata	14	0.1	0	0.0	0	0.0
Clematis ligusticifolia	29	0.6	67	13.7	100	1.0
Cornus sericea	0	0.0	100	92.0	67	21.0
Crataegus columbiana	0	0.0	0	0.0	33	10.0
Crataegus douglasii	100	66.9	0	0.0	0	0.0
Philadelphus lewisii	43	3.0	0	0.0	100	66.7
Prunus virginiana	43	1.0	0	0.0	67	20.0
Ribes aureum	57	1.4	67	0.7	0	0.0
Ribes cereum	14	1.4	0	0.0	0	0.0
Ribes inerme	0	0.0	33	0.3	0	0.0
Rosa woodsii	86	8.0	100	7.0	0	0.0
Salix exigua	0	0.0	33	3.3	0	0.0
Salix lasiolepis	57	10.4	0	0.0	0	0.0
Salix lutea	0	0.0	33	0.3	0	0.0
Toxicodendron rydbergii	0	0.0	33	1.0	33	0.3
FORBS						
Achillea millefolium	100	1.3	33	0.3	0	0.0
Agoseris grandiflora	14	0.1	0	0.0	0	0.0
Arabis glabra	0	0.0	0	0.0	33	0.3
Artemisia ludoviciana	14	0.1	33	0.3	0	0.0
Asperugo procumbens	0	0.0	0	0.0	33	1.0
Aster sp.	14	0.1	0	0.0	0	0.0
Chamaesyce serpyllifolia	14	0.1	0	0.0	0	0.0
Cirsium arvense	29	4.4	67	0.7	0	0.0
Collomia grandiflora	43	0.4	0	0.0	33	0.3
Conium maculatum	14	0.1	0	0.0	33	0.3
Epilobium brachycarpum	14	0.1	0	0.0	67	0.7
Epilobium ciliatum	14	0.1	0	0.0	67	0.7
Epilobium glaberrimum	14	0.4	0	0.0	0	0.0
Forbs sp.	0	0.0	0	0.0	33	0.3
Fragaria vesca	14	0.1	0	0.0	0	0.0
Galium aparine	29	0.3	0	0.0	67	1.3
Geum macrophyllum	14	0.1	67	0.7	0	0.0
Gnaphalium palustre	14	0.1	0	0.0	0	0.0
Hackelia patens	0	0.0	33	0.3	0	0.0
Helianthus nuttallii	14	0.1	0	0.0	0	0.0
Lactuca serriola	14	0.1	33	0.3	33	0.3
Lemna minor	29	0.3	0	0.0	0	0.0
Lepidium campestre	0	0.0	33	0.3	0	0.0
Lithospermum arvense	0	0.0	0	0.0	33	0.3
Lomatium nudicaule	14	0.1	0	0.0	0	0.0
Lomatium sp.	14	0.1	0	0.0	0	0.0
Lupinus arbustus	14	0.1	0	0.0	0	0.0
Medicago lupulina	57	1.1	0	0.0	33	0.3
Melilotus officinalis	57	1.4	0	0.0	0	0.0
Mentha arvensis	43	0.4	0	0.0	33	0.3
Mimulus guttatus	29	0.3	33	0.3	33	0.3
Mimulus nanus	14	0.1	0	0.0	0	0.0

	CRDO2/ROWO		COST4		PHLE4	
Montia perfoliata	14	0.1	0	0.0	67	7.7
Nemophila breviflora	0	0.0	0	0.0	33	0.3
Nemophila kirtleyi	0	0.0	0	0.0	33	0.3
Nepeta cataria	29	0.3	0	0.0	0	0.0
Onopordum acanthium	43	0.4	0	0.0	67	1.3
Osmorhiza chilensis	71	2.6	0	0.0	67	1.3
Osmorhiza occidentalis	14	0.4	0	0.0	0	0.0
Panetaria pensylvanica	0	0.0	0	0.0	33	0.3
Perideridia bolanderi	14	0.1	0	0.0	0	0.0
Perideridia montana	14	0.1	0	0.0	0	0.0
Plantago major	29	0.6	0	0.0	0	0.0
Polygonum douglasii	0	0.0	0	0.0	33	0.3
Potentilla gracilis	14	0.1	0	0.0	0	0.0
Ranunculus inamoenus	14	0.1	0	0.0	0	0.0
Rorippa nasturtium-aquaticum	29	0.6	33	0.3	33	0.3
Rumex crispus	57	0.6	0	0.0	33	0.3
Senecio hydrophiloides	14	0.1	0	0.0	0	0.0
Senecio serra	0	0.0	33	0.3	0	0.0
Senecio triangularis	14	0.1	0	0.0	0	0.0
Sidalcea oregana	14	0.1	0	0.0	0	0.0
Silene menziesii	0	0.0	0	0.0	33	0.3
Sisymbrium altissimum	0	0.0	0	0.0	33	0.3
Smilacina stellata	29	0.9	33	0.3	0	0.0
Solanum dulcamara	0	0.0	0	0.0	33	0.3
Stellaria media	14	0.1	0	0.0	67	3.7
Taraxacum officinale	86	1.4	0	0.0	0	0.0
Tragopogon dubius	43	0.4	0	0.0	0	0.0
Urtica dioica	43	0.4	100	1.7	67	2.0
Verbascum thapsus	57	0.6	0	0.0	0	0.0
Veronica americana	14	0.4	0	0.0	0	0.0
Veronica anagallis-aquatica	14	0.1	33	0.3	0	0.0
Veronica biloba	14	0.1	0	0.0	67	0.7
Wyethia amplexicaulis	14	0.1	0	0.0	0	0.0
FERNS AND FERN ALLIES						
Equisetum arvense	14	1.4	0	0.0	0	0.0
Equisetum laevigatum	0	0.0	33	0.3	0	0.0
GRAMINOIDS						
Alopecurus aequalis	14	0.1	0	0.0	0	0.0
Bromus japonicus	29	0.3	0	0.0	0	0.0
Carex hoodii	14	0.1	0	0.0	0	0.0
Carex lanuginosa	0	0.0	33	0.3	0	0.0
Carex microptera	14	0.4	0	0.0	0	0.0
Deschampsia elongata	14	0.4	33	0.3	33	0.3
Eleocharis palustris	0	0.0	33	0.3	0	0.0
Elymus glaucus	86	14.0	33	0.3	0	0.0
Glyceria elata	14	0.1	33	0.3	0	0.0
Glyceria striata	29	0.6	0	0.0	0	0.0
Juncus ensifolius	14	2.9	0	0.0	0	0.0
Poa bulbosa	43	5.9	0	0.0	33	6.7
Poa pratensis	100	8.9	0	0.0	33	1.0
Polypogon monspeliensis	14	0.1	0	0.0	33	0.3
Scirpus microcarpus	29	1.6	0	0.0	33	0.3

PRUNUS VIRGINIANA, PRUNUS EMARGINATA, AND RHUS TRILOBATA ALLIANCES

# PLOTS	PRVI n=1		PRVI/ELGL n=4		PREM n=1		RHTR n=1	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER
TREES								
Juniperus occidentalis	0	0.0	0	0.0	100	1.0	0	0.0
Juniperus scopulorum	0	0.0	25	0.3	0	0.0	0	0.0
Pseudotsuga menziesii	0	0.0	0	0.0	100	1.0	0	0.0
SHRUBS								
Acer glabrum	0	0.0	0	0.0	100	10.0	0	0.0
Artemisia tridentata ssp. tridentata	0	0.0	50	1.0	0	0.0	0	0.0
Berberis repens	0	0.0	25	0.3	0	0.0	0	0.0
Clematis ligusticifolia	0	0.0	100	20.0	100	3.0	100	1.0
Cornus sericea	0	0.0	50	3.3	100	1.0	0	0.0
Crataegus douglasii	0	0.0	0	0.0	100	1.0	0	0.0
Philadelphus lewisii	0	0.0	0	0.0	100	20.0	0	0.0
Physocarpus malvaceus	0	0.0	0	0.0	100	10.0	0	0.0
Prunus emarginata	0	0.0	0	0.0	100	50.0	0	0.0
Prunus virginiana	100	80.0	100	69.5	100	3.0	0	0.0
Rhus trilobata	0	0.0	0	0.0	0	0.0	100	98.0
Ribes aureum	100	3.0	25	0.3	0	0.0	0	0.0
Ribes inerme	0	0.0	50	2.8	0	0.0	0	0.0
Ribes setosum	0	0.0	25	0.3	0	0.0	0	0.0
Rosa woodsii	100	10.0	100	5.5	100	20.0	0	0.0
Salix lutea	100	10.0	0	0.0	0	0.0	0	0.0
Sambucus cerulea	0	0.0	25	0.3	0	0.0	0	0.0
Spiraea betulifolia	0	0.0	0	0.0	100	10.0	0	0.0
Symphoricarpos oreophilus	0	0.0	0	0.0	100	3.0	0	0.0
Toxicodendron rydbergii	0	0.0	25	0.3	0	0.0	0	0.0
FORBS								
Achillea millefolium	0	0.0	25	0.3	100	1.0	0	0.0
Agastache urticifolia	0	0.0	25	0.3	0	0.0	0	0.0
Allium acuminatum	0	0.0	0	0.0	100	1.0	0	0.0
Aquilegia formosa	0	0.0	0	0.0	100	1.0	0	0.0
Arnica cordifolia	0	0.0	0	0.0	100	10.0	0	0.0
Asperugo procumbens	0	0.0	0	0.0	100	1.0	0	0.0
Chenopodium album	0	0.0	25	0.3	0	0.0	0	0.0
Cirsium vulgare	0	0.0	0	0.0	100	3.0	0	0.0
Descurainia sophia	0	0.0	25	0.3	0	0.0	0	0.0
Disporum trachycarpum	0	0.0	0	0.0	100	1.0	0	0.0
Galium aparine	100	10.0	25	0.3	100	20.0	0	0.0
Galium triflorum	0	0.0	75	1.3	0	0.0	0	0.0
Hackelia floribunda	0	0.0	25	0.3	0	0.0	0	0.0
Hackelia patens	0	0.0	25	0.3	0	0.0	0	0.0
Lithophragma parviflorum	0	0.0	0	0.0	100	1.0	0	0.0
Lomatium dissectum var. multifidum	0	0.0	0	0.0	100	1.0	0	0.0
Montia perfoliata	100	1.0	25	0.3	100	20.0	0	0.0
Nemophila kirtleyi	0	0.0	0	0.0	100	1.0	0	0.0
Nepeta cataria	0	0.0	0	0.0	100	1.0	0	0.0
Osmorhiza chilensis	100	50.0	0	0.0	100	10.0	0	0.0
Polygonum convolvulus	0	0.0	0	0.0	100	1.0	0	0.0
Senecio serra	0	0.0	25	0.3	0	0.0	0	0.0
Silene menziesii	0	0.0	0	0.0	100	1.0	0	0.0
Smilacina stellata	0	0.0	50	1.0	100	20.0	0	0.0
Stellaria media	0	0.0	0	0.0	100	20.0	0	0.0
Tonella floribunda	0	0.0	0	0.0	100	1.0	0	0.0
Tragopogon dubius	0	0.0	25	0.3	100	1.0	0	0.0
Trillium petiolatum	0	0.0	0	0.0	100	1.0	0	0.0

	PRVI		PRVI/ELGL		PREM		RHTR	
Urtica dioica	100	1.0	50	5.8	100	3.0	100	1.0
Verbascum thapsus	0	0.0	0	0.0	100	1.0	0	0.0
Veronica arvensis	0	0.0	0	0.0	100	1.0	0	0.0
FERNS AND FERN ALLIES								
Equisetum sp.	0	0.0	25	0.8	0	0.0	0	0.0
Equisetum arvense	0	0.0	25	0.3	0	0.0	0	0.0
GRAMINOIDS								
Bromus tectorum	0	0.0	25	0.8	0	0.0	0	0.0
Carex backii var saximontana	0	0.0	0	0.0	100	1.0	0	0.0
Deschampsia elongata	0	0.0	25	0.3	0	0.0	0	0.0
Elymus cinereus	0	0.0	25	0.8	0	0.0	0	0.0
Elymus glaucus	0	0.0	100	32.8	100	10.0	0	0.0
Poa pratensis	0	0.0	75	3.5	100	10.0	0	0.0

SALIX EXIGUA AND SALIX GEYERIANA ALLIANCES

# PLOTS	SAEX/BARREN n=6		SAEX/MEGR n=7		SAEX/POPR n=1		SAGE2/CAUT n=2		SAGE2/MEFO n=2	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
SHRUBS										
Alnus incana	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Amelanchier alnifolia	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Clematis ligusticifolia	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Cornus sericea	0	0.0	29	0.3	0	0.0	0	0.0	0	0.0
Ribes aureum	0	0.0	0	0.0	0	0.0	0	0.0	50	1.5
Ribes inerme	0	0.0	0	0.0	0	0.0	0	0.0	100	5.5
Rosa woodsii	33	0.3	57	2.1	100	1.0	0	0.0	0	0.0
Salix boothii	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Salix drummondiana	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Salix exigua	100	46.7	100	69.7	100	90.0	0	0.0	0	0.0
Salix geyeriana	0	0.0	0	0.0	0	0.0	100	45.0	100	80.0
Salix lasiandra var. caudata	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0
Salix lemmonii	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Salix lutea	0	0.0	71	1.3	100	1.0	0	0.0	50	15.0
FORBS										
Achillea millefolium	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Aconitum columbianum	0	0.0	0	0.0	0	0.0	0	0.0	50	10.0
Amaranthus californicus	33	0.3	14	0.1	0	0.0	0	0.0	0	0.0
Apocynum cannabinum	17	0.2	57	0.9	0	0.0	0	0.0	0	0.0
Aquilegia formosa	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Arctium minus	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Arnica sororia	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia biennis	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Artemisia ludoviciana	67	1.3	14	0.1	100	1.0	0	0.0	0	0.0
Aster ascendens	33	0.3	0	0.0	0	0.0	50	0.5	0	0.0
Aster hesperius	0	0.0	43	6.3	0	0.0	0	0.0	0	0.0
Berula erecta	0	0.0	29	0.3	0	0.0	0	0.0	0	0.0
Cardaria draba	33	0.3	14	0.1	0	0.0	0	0.0	0	0.0
Castilleja exilis	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Castilleja miniata	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Cerastium viscosum	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Chenopodium album	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Chenopodium leptophyllum	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Chenopodium sp.	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Cicuta douglasii	0	0.0	14	4.3	0	0.0	0	0.0	0	0.0
Cicuta maculata	0	0.0	43	0.7	0	0.0	0	0.0	0	0.0
Circaea alpina	0	0.0	0	0.0	0	0.0	0	0.0	50	5.0
Cirsium arvense	33	0.3	29	0.3	100	1.0	0	0.0	50	0.5
Cirsium vulgare	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Conyza canadensis	33	0.3	14	0.1	0	0.0	0	0.0	0	0.0
Delphinium sp.	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium ciliatum	0	0.0	14	0.1	0	0.0	50	0.5	50	15.0
Euthamia occidentalis	50	1.2	71	12.0	0	0.0	0	0.0	0	0.0
Galium aparine	0	0.0	0	0.0	0	0.0	0	0.0	50	1.5
Galium boreale	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Galium triflorum	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Geum macrophyllum	0	0.0	0	0.0	0	0.0	100	1.0	100	5.5
Glycyrrhiza lepidota	17	0.2	57	1.1	0	0.0	0	0.0	0	0.0
Gnaphalium palustre	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Heracleum lanatum	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Hypericum formosum	33	0.3	0	0.0	0	0.0	100	1.0	0	0.0
Iva axillaris	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Lactuca serriola	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0

	SAEX/BARREN		SAEX/MEGR		SAEX/POPR		SAGE2/CAUT		SAGE2/MEFO	
Lycopus americanus	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Madia gracilis	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Medicago lupulina	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Melilotis sp.	33	0.3	14	0.1	0	0.0	0	0.0	0	0.0
Mentha arvensis	33	0.3	71	1.0	100	3.0	0	0.0	0	0.0
Mertensia ciliata	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Mimulus guttatus	0	0.0	0	0.0	0	0.0	50	0.5	100	20.5
Montia chamissoi	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Plantago major	17	0.2	86	1.1	0	0.0	0	0.0	0	0.0
Polygonum aviculare	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Polygonum hydropiperoides	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0
Polygonum persicaria	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Polygonum sp.	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Potentilla anserina	0	0.0	71	0.7	0	0.0	0	0.0	0	0.0
Potentilla gracilis	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Potentilla rivalis	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Rorripa sp.	17	0.2	0	0.0	100	1.0	0	0.0	0	0.0
Rumex sp.	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Rumex crispus	67	0.7	43	0.4	100	1.0	0	0.0	0	0.0
Scutellaria galericulata	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Senecio hydrophilus	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Senecio pseudareus	0	0.0	0	0.0	0	0.0	0	0.0	50	10.0
Senecio serra	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Sidalcea oregana	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Smilacina stellata	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Solanum dulcamara	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Solidago canadensis	0	0.0	0	0.0	100	3.0	0	0.0	0	0.0
Solidago missouriensis	50	0.5	0	0.0	100	1.0	0	0.0	0	0.0
Stellaria crispa	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Taraxacum officinale	0	0.0	14	0.1	100	1.0	0	0.0	0	0.0
Thermopsis rhombifolia	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Typha latifolia	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Urtica dioica	0	0.0	29	0.3	100	1.0	0	0.0	50	1.5
Veratrum californicum	33	0.7	0	0.0	0	0.0	50	0.5	50	0.5
Verbascum thapsus	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Veronica americana	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Veronica anagallis-aquatica	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Viola sp.	17	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Wyethia amplexicaulis	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Xanthium strumarium	50	0.8	71	3.4	0	0.0	0	0.0	0	0.0
FERNS AND FERN ALLIES										
Equisetum arvense	17	0.2	71	23.3	0	0.0	0	0.0	0	0.0
Equisetum laevigatum	33	0.7	57	8.1	0	0.0	0	0.0	0	0.0
GRAMINOIDS										
Carex utriculata	0	0.0	14	0.1	0	0.0	100	94.0	0	0.0
Eleocharis palustris	17	0.2	100	5.0	100	10.0	0	0.0	0	0.0
Agrostis stolonifera	17	0.5	43	8.7	0	0.0	0	0.0	100	1.0
Poa pratensis	17	0.2	14	0.1	100	10.0	0	0.0	50	0.5
Agropyron repens	50	0.8	43	7.7	0	0.0	0	0.0	0	0.0
Scirpus pungens	17	0.2	71	5.3	0	0.0	0	0.0	0	0.0
Phalaris arundinacea	50	0.5	71	2.1	0	0.0	0	0.0	0	0.0
Poa palustris	0	0.0	0	0.0	100	10.0	0	0.0	0	0.0
Agrostis exarata	33	0.3	0	0.0	100	1.0	0	0.0	0	0.0
Carex athrostachya	33	0.3	0	0.0	100	1.0	0	0.0	0	0.0
Carex lanuginosa	17	0.2	71	2.9	0	0.0	0	0.0	0	0.0
Agropyron smithii	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Carex nebrascensis	0	0.0	0	0.0	0	0.0	50	0.5	50	0.5

	SAEX/BARREN		SAEX/MEGR		SAEX/POPR		SAGE2/CAUT		SAGE2/MEFO	
Elymus cinereus	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Glyceria grandis	0	0.0	0	0.0	0	0.0	50	0.5	50	0.5
Crypsis alopecuroides	33	0.7	43	0.4	0	0.0	0	0.0	0	0.0
Carex sheldonii	0	0.0	14	4.3	0	0.0	0	0.0	0	0.0
Juncus ensifolius	0	0.0	14	0.1	0	0.0	0	0.0	50	1.5
Leersia oryzoides	17	0.2	43	0.4	0	0.0	0	0.0	0	0.0
Puccinellia pauciflora	0	0.0	0	0.0	0	0.0	0	0.0	50	1.5
Deschampsia elongata	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Carex pachystachya	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Scirpus microcarpus	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Bromus inermis	33	0.3	14	0.1	0	0.0	0	0.0	0	0.0
Panicum capillare	33	0.3	14	0.1	0	0.0	0	0.0	0	0.0
Danthonia californica	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Juncus orthophyllus	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Bromus tectorum	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Hordeum brachyantherum	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Juncus bufonius	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Phleum pratense	17	0.2	14	0.1	0	0.0	0	0.0	0	0.0
Glyceria elata	0	0.0	29	0.3	0	0.0	0	0.0	0	0.0
Phragmites australis	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0
Scirpus fluviatilis	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0
Cyperus aristatus	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Echinochloa crus-galli	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Elymus glaucus	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Hordeum jubatum	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Juncus balticus	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Juncus longistylis	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Alopecurus aequalis	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Muhlenbergia asperifolia	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0
Polypogon monspeliensis	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0

SALIX LASIANDRA, SALIX LASIOLEPIS, SALIX LEMONII, AND SALIX LUTEA ALLIANCES

# PLOTS	SALA5/BENCH n=2		SALA5/COST4 n=3		SALA6 n=7		SALA6/BARREN n=8		SALE/BENCH n=2		SALU2/POPR n=1		SALU2/ROWO n=3	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
TREES														
Alnus rhombifolia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	1.0
Celtis reticulata	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	1.0
Juniperus occidentalis	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Populus trichocarpa	0	0.0	0	0.0	14	1.4	0	0.0	0	0.0	0	0.0	33	0.3
Salix amygdaloides	0	0.0	0	0.0	14	1.4	13	0.4	0	0.0	0	0.0	33	3.3
SHRUBS														
Acer glabrum	0	0.0	0	0.0	0	0.0	13	0.1	50	0.5	0	0.0	0	0.0
Alnus incana	0	0.0	0	0.0	0	0.0	13	3.8	0	0.0	0	0.0	33	0.3
Amelanchier alnifolia	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Artemisia tridentata ssp. tridentata	0	0.0	0	0.0	57	3.4	13	0.4	0	0.0	0	0.0	0	0.0
Betula occidentalis	0	0.0	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0	67	4.3
Chrysothamnus nauseosus	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Clematis ligusticifolia	0	0.0	0	0.0	43	4.3	50	1.9	0	0.0	0	0.0	67	2.0
Cornus sericea	50	0.5	100	37.0	29	8.7	25	6.3	0	0.0	0	0.0	0	0.0
Crataegus douglasii	0	0.0	0	0.0	14	0.1	38	1.8	0	0.0	0	0.0	33	3.3
Philadelphus lewisii	0	0.0	0	0.0	86	4.7	25	3.8	0	0.0	0	0.0	67	1.3
Physocarpus malvaceus	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Prunus emarginata	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Prunus virginiana	50	10.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	33	0.3
Rhus glabra	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Ribes aureum	50	1.5	33	0.3	29	0.3	50	0.8	0	0.0	100	1.0	33	3.3
Ribes inerme	0	0.0	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Ribes sp.	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	100	3.0	0	0.0
Rosa woodsii	100	20.5	67	1.3	29	0.6	75	5.9	100	1.0	100	3.0	67	7.0
Rubus idaeus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	6.7
Rubus leucodermis	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Salix bebbiana	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Salix boothii	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	20.0	0	0.0
Salix exigua	0	0.0	33	1.0	14	4.3	0	0.0	0	0.0	0	0.0	0	0.0
Salix geyeriana	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0	0	0.0
Salix lasiandra var. caudata	100	79.0	100	73.3	14	0.4	13	1.3	0	0.0	0	0.0	0	0.0
Salix lasiolepis	0	0.0	33	3.3	100	54.3	100	73.5	0	0.0	0	0.0	33	0.3
Salix lemmonii	0	0.0	0	0.0	0	0.0	0	0.0	100	60.0	0	0.0	0	0.0
Salix lutea	0	0.0	100	17.7	29	4.3	13	0.1	0	0.0	100	30.0	100	80.0
Symphoricarpos albus	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Symphoricarpos oreophilus	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Toxicodendron rydbergii	0	0.0	0	0.0	14	1.4	0	0.0	0	0.0	0	0.0	67	7.7
FORBS														
Achillea millefolium	0	0.0	0	0.0	29	0.3	25	0.3	100	1.0	100	1.0	33	0.3
Actea rubra	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Agoseris heterophylla	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Amsinckia tessellata	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Angelica arguta	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Aquilegia formosa	0	0.0	33	0.3	0	0.0	13	0.1	50	0.5	0	0.0	0	0.0
Arctium minus	0	0.0	0	0.0	0	0.0	25	0.5	0	0.0	0	0.0	0	0.0
Artemisia dracunculus	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia ludoviciana	0	0.0	33	0.3	57	0.9	38	0.4	100	1.0	100	1.0	0	0.0
Asclepias speciosa	0	0.0	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0	0	0.0
Aster ascendens	0	0.0	0	0.0	0	0.0	13	1.3	100	6.5	0	0.0	0	0.0
Aster hesperius	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Aster sp.	0	0.0	0	0.0	14	1.4	0	0.0	0	0.0	0	0.0	33	1.0
Cardaria draba	0	0.0	0	0.0	0	0.0	13	0.4	0	0.0	0	0.0	0	0.0
Castilleja miniata	0	0.0	0	0.0	0	0.0	0	0.0	100	5.5	0	0.0	0	0.0

	SALA5/BENCH		SALA5/COST4		SALA6		SALA6/BARREN		SALE/BENCH		SALU2/POPR		SALU2/ROWO	
Chamaesyce serpyllifolia	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Chenopodium album	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Chondrilla juncea	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Cicuta maculata	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Circaea alpina	50	0.5	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Cirsium arvense	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	100	1.0	33	3.3
Cirsium scariosum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Cirsium vulgare	100	1.0	33	0.3	0	0.0	13	0.1	0	0.0	0	0.0	33	0.3
Collomia grandiflora	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Collomia linearis	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Conium maculatum	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	33	0.3
Delphinium sp.	0	0.0	0	0.0	0	0.0	0	0.0	100	2.0	0	0.0	0	0.0
Epilobium brachycarpum	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium ciliatum	0	0.0	67	0.7	43	0.7	63	0.9	50	0.5	0	0.0	33	0.3
Epilobium densiflorum	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium glaberrimum	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Erigeron strigosus	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	33	0.3
Euthamia occidentalis	50	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Galium aparine	50	0.5	33	0.3	14	2.9	38	0.6	0	0.0	100	1.0	67	1.3
Galium boreale	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Galium triflorum	0	0.0	33	0.3	0	0.0	13	0.1	0	0.0	0	0.0	33	0.3
Gentiana affinis	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Geranium viscosissimum	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Geum macrophyllum	50	0.5	33	0.3	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Grindelia squarrosa	0	0.0	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0	0	0.0
Hackelia floribunda	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Helianthus annuus	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Heracleum lanatum	0	0.0	33	0.3	0	0.0	0	0.0	100	6.5	0	0.0	0	0.0
Hydrophyllum capitatum	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Hypericum formosum	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Hypericum perforatum	0	0.0	33	0.3	0	0.0	25	0.3	0	0.0	0	0.0	33	0.3
Lactuca serriola	0	0.0	33	0.3	71	0.7	38	0.4	0	0.0	100	1.0	33	0.3
Lemna minor	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Medicago lupulina	0	0.0	0	0.0	43	2.3	13	0.1	0	0.0	0	0.0	33	0.3
Melilotus officinalis	0	0.0	0	0.0	71	11.9	0	0.0	0	0.0	0	0.0	0	0.0
Mentha arvensis	0	0.0	0	0.0	29	0.3	13	0.1	100	1.0	100	1.0	0	0.0
Mertensia ciliata	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Mimulus guttatus	50	0.5	33	0.3	57	0.9	50	0.5	0	0.0	0	0.0	33	1.0
Montia perfoliata	50	0.5	0	0.0	0	0.0	13	0.4	0	0.0	0	0.0	33	0.3
Navarretia intertexta	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Nepeta cataria	0	0.0	33	0.3	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Oenothera elata	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Onopordum acanthium	0	0.0	0	0.0	43	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Osmorhiza chilensis	0	0.0	33	0.3	14	0.1	13	0.1	0	0.0	0	0.0	0	0.0
Perideridia montana	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Polygonum amphibium	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Polygonum hydropiperoides	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Polygonum sp.	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Potentilla gracilis	0	0.0	0	0.0	14	0.1	0	0.0	100	2.0	0	0.0	0	0.0
Potentilla rivalis	0	0.0	33	0.3	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Prunella vulgaris	0	0.0	0	0.0	0	0.0	13	0.4	0	0.0	0	0.0	0	0.0
Ranunculus aquatilis	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Ranunculus cymbalaria	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Ranunculus uncinatus	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rorippa nasturtium-aquaticum	0	0.0	0	0.0	57	4.6	13	0.4	0	0.0	0	0.0	33	0.3
Rudbeckia occidentalis	0	0.0	33	0.3	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Rumex crispus	0	0.0	33	0.3	57	0.9	38	0.4	0	0.0	100	1.0	67	1.3

	SALA5/BENCH		SALA5/COST4		SALA6		SALA6/BARREN		SALE/BENCH		SALU2/POPR		SALU2/ROWO	
Rumex occidentalis	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Rumex salicifolius	50	0.5	0	0.0	0	0.0	13	0.1	50	0.5	0	0.0	0	0.0
Senecio pseudareus	0	0.0	0	0.0	0	0.0	0	0.0	50	1.5	0	0.0	0	0.0
Senecio serra	0	0.0	0	0.0	0	0.0	0	0.0	50	5.0	100	1.0	0	0.0
Smilacina racemosa	0	0.0	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Smilacina stellata	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0	33	0.3
Solanum dulcamara	0	0.0	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0	33	0.3
Solidago canadensis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	30.0	0	0.0
Solidago missouriensis	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Stellaria media	50	5.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Taraxacum officinale	0	0.0	0	0.0	43	0.4	25	0.3	0	0.0	0	0.0	33	1.0
Tragopogon dubius	0	0.0	0	0.0	43	0.4	13	0.1	0	0.0	0	0.0	0	0.0
Trifolium dubium	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Trifolium repens	0	0.0	0	0.0	29	0.6	13	0.1	50	0.5	0	0.0	0	0.0
Typha latifolia	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Urtica dioica	50	1.5	67	0.7	14	0.1	38	0.6	0	0.0	100	1.0	67	1.3
Veratrum californicum	0	0.0	0	0.0	0	0.0	0	0.0	100	2.0	0	0.0	0	0.0
Verbascum thapsus	0	0.0	0	0.0	29	0.3	50	0.5	0	0.0	0	0.0	33	0.3
Veronica americana	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	33	0.3
Veronica anagallis-aquatica	0	0.0	0	0.0	86	1.1	25	0.3	0	0.0	0	0.0	33	0.3
Viola sp.	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Wyethia amplexicaulis	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Xanthium strumarium	0	0.0	0	0.0	57	1.4	0	0.0	0	0.0	0	0.0	0	0.0
FERNS AND FERN ALLIES														
Equisetum arvense	0	0.0	0	0.0	57	17.3	0	0.0	0	0.0	0	0.0	33	0.3
Equisetum hyemale	0	0.0	0	0.0	0	0.0	25	2.9	0	0.0	0	0.0	33	1.0
Equisetum laevigatum	0	0.0	0	0.0	43	0.7	0	0.0	0	0.0	0	0.0	0	0.0
GRAMINOIDS														
Agropyron smithii	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Agrostis exarata	0	0.0	33	0.3	14	0.4	13	0.1	100	2.0	100	1.0	33	0.3
Agrostis scabra	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	100	1.0	0	0.0
Agrostis stolonifera	0	0.0	0	0.0	29	2.9	13	0.1	0	0.0	0	0.0	33	0.3
Bromus brizaeformis	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Bromus japonicus	0	0.0	0	0.0	57	3.4	13	0.1	0	0.0	0	0.0	0	0.0
Bromus tectorum	0	0.0	0	0.0	43	0.7	38	0.4	0	0.0	0	0.0	0	0.0
Carex athrostachya	50	0.5	0	0.0	14	0.1	0	0.0	50	0.5	100	1.0	0	0.0
Carex lanuginosa	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0	0	0.0
Carex sp.	50	0.5	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Carex stipata	50	0.5	33	0.3	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Catabrosa aquatica	0	0.0	0	0.0	29	0.6	0	0.0	0	0.0	0	0.0	0	0.0
Deschampsia elongata	50	0.5	0	0.0	14	0.1	13	0.1	0	0.0	0	0.0	0	0.0
Eleocharis palustris	0	0.0	0	0.0	29	1.6	0	0.0	0	0.0	100	3.0	0	0.0
Elymus glaucus	0	0.0	67	1.3	57	8.9	38	0.6	50	0.5	0	0.0	33	0.3
Festuca arundinacea	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Glyceria elata	0	0.0	33	0.3	29	0.3	13	0.1	50	0.5	0	0.0	0	0.0
Glyceria striata	0	0.0	0	0.0	29	0.9	0	0.0	0	0.0	0	0.0	0	0.0
Juncus ensifolius	0	0.0	33	0.3	57	3.1	0	0.0	50	0.5	100	1.0	0	0.0
Juncus longistylis	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Juncus orthophyllus	0	0.0	0	0.0	0	0.0	0	0.0	100	5.5	0	0.0	0	0.0
Juncus tenuis	0	0.0	0	0.0	14	1.4	0	0.0	50	0.5	0	0.0	0	0.0
Juncus torreyi	0	0.0	0	0.0	14	0.4	0	0.0	0	0.0	0	0.0	0	0.0
Paspalum distichum	0	0.0	0	0.0	29	1.6	0	0.0	0	0.0	0	0.0	0	0.0
Phleum pratense	0	0.0	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0
Poa bulbosa	0	0.0	0	0.0	43	2.3	0	0.0	0	0.0	0	0.0	0	0.0
Poa palustris	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Poa pratensis	50	10.0	33	0.3	71	17.1	50	0.8	100	5.5	100	20.0	33	1.0
Polypogon monspeliensis	0	0.0	0	0.0	57	0.6	0	0.0	0	0.0	0	0.0	0	0.0

	SALA5/BENCH		SALA5/COST4		SALA6		SALA6/BARREN		SALE/BENCH		SALU2/POPR		SALU2/ROWO	
Puccinellia pauciflora	50	30.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Scirpus microcarpus	50	5.0	67	0.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sitanion hystrix var hordeoides	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Taeniatherum caput-medusae	0	0.0	0	0.0	14	0.1	0	0.0	0	0.0	0	0.0	0	0.0

ARTEMISIA CANA, ARTEMISIA PAPPOSA, ARTEMISIA TRIDENTATA TRIDENTATA AND SARCOBATUS VERMICULATUS ALLIANCES

	ARCA13/DRYGRAM		ARCA13/FEID		ARCA13/MURI		ARPA16		ARTRT/ELCI2		SAVE4/DISP		SAVE4/POSE	
# PLOTS	n=6		n=2		n=8		n=4		n=6		n=1		n=1	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
SHRUBS														
Artemisia arbuscula	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Artemisia cana	100	36.7	100	47.5	100	32.9	25	0.3	0	0.0	0	0.0	0	0.0
Artemisia papposa	0	0.0	0	0.0	0	0.0	100	25.0	0	0.0	0	0.0	0	0.0
Artemisia tridentata ssp. tridentata	0	0.0	0	0.0	0	0.0	0	0.0	100	33.3	0	0.0	100	1.0
Artemisia tridentata ssp. wyomingensis	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Atriplex confertifolia	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Chrysothamnus nauseosus	17	0.2	0	0.0	0	0.0	0	0.0	50	2.3	0	0.0	0	0.0
Chrysothamnus viscidiflorus	0	0.0	0	0.0	0	0.0	0	0.0	50	2.0	0	0.0	0	0.0
Clematis ligusticifolia	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Grayia spinosa	0	0.0	0	0.0	0	0.0	0	0.0	17	0.5	0	0.0	0	0.0
Ribes aureum	0	0.0	0	0.0	0	0.0	0	0.0	17	0.5	0	0.0	0	0.0
Rosa woodsii	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Sarcobatus vermiculatus	0	0.0	0	0.0	0	0.0	0	0.0	50	11.7	100	20.0	100	40.0
FORBS														
Achillea millefolium	33	0.3	100	2.5	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Agoseris heterophylla	17	0.2	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Agoseris sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Allium acuminatum	33	0.3	0	0.0	0	0.0	75	0.8	17	0.2	0	0.0	0	0.0
Antennaria dimorpha	17	0.2	0	0.0	13	0.1	25	0.5	0	0.0	0	0.0	0	0.0
Antennaria luzuloides	17	0.2	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0
Antennaria stenophylla	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Arabis sp.	17	0.2	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Arenaria congesta	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Arnica sororia	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia dracunculus	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Artemisia ludoviciana	17	0.5	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Aster ascendens	0	0.0	100	3.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Aster sp.	17	0.2	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Astragalus lentigenosus	17	0.2	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Atriplex patula	0	0.0	0	0.0	13	0.4	0	0.0	0	0.0	0	0.0	0	0.0
Balsamorhiza hookeri	17	0.2	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Blepharipappus scaber	17	0.2	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Brickellia oblongifolia	17	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Camassia quamash	17	0.2	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Camelina microcarpa	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Camissonia tanacetifolia	17	0.2	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Cardaria draba	0	0.0	0	0.0	0	0.0	0	0.0	17	0.5	0	0.0	0	0.0
Castilleja pallescens	0	0.0	50	0.5	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Chenopodium album	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Chorispora tenella	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Cirsium scariosum	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Cirsium sp.	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Collinsia parviflora	0	0.0	50	0.5	13	0.1	25	0.3	17	0.2	0	0.0	0	0.0
Conium maculatum	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Crepis acuminata	17	0.2	0	0.0	25	0.3	0	0.0	17	0.2	0	0.0	0	0.0
Crepis sp.	17	0.2	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Delphinium occidentale	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Descurainia sophia	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	100	1.0
Draba verna	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium brachycarpum	67	0.7	100	2.0	25	1.6	75	1.3	0	0.0	0	0.0	0	0.0
Epilobium pallidum	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium pygmaeum	33	5.2	0	0.0	38	0.4	0	0.0	0	0.0	0	0.0	0	0.0
Eriastrum sparsiflorum	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

	ARCA13/DRYGRAM		ARCA13/FEID		ARCA13/MURI		ARPA16		ARTRT/ELCI2		SAVE4/DISP		SAVE4/POSE	
Erigeron chrysopsidis	0	0.0	0	0.0	13	0.1	25	0.3	0	0.0	0	0.0	0	0.0
Erigeron pumilus	0	0.0	50	3.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Erigeron sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Eriogonum caespitosum	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Eriogonum sphaerocephalum	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Geranium viscosissimum	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Gilia sp.	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Gnaphalium palustre	50	0.5	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Haplopappus stenophyllus	0	0.0	0	0.0	0	0.0	50	4.0	0	0.0	0	0.0	0	0.0
Haplopappus uniflorus var. howellii	17	0.2	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Iva axillaris	0	0.0	0	0.0	25	0.3	0	0.0	17	0.2	0	0.0	0	0.0
Lactuca pulchella	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Lactuca serriola	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3	0	0.0	0	0.0
Lappula redowskii	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Lepidium campestre	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Lepidium perfoliatum	0	0.0	0	0.0	0	0.0	0	0.0	67	1.0	0	0.0	100	10.0
Linum lewisii	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Lomatium cous	33	0.3	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Lomatium leptocarpum	17	3.3	0	0.0	0	0.0	50	2.8	0	0.0	0	0.0	0	0.0
Lomatium sp.	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Lupinus lepidus	0	0.0	50	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Lupinus brevicaulis	0	0.0	0	0.0	25	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Madia gracilis	0	0.0	100	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Melilotus officinalis	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Mentzelia albicaulis	17	0.2	0	0.0	13	0.1	0	0.0	17	0.2	0	0.0	0	0.0
Microseris nutans	33	0.3	50	0.5	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Microseris sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Microsteris gracilis	33	0.3	0	0.0	0	0.0	25	0.3	17	0.2	0	0.0	0	0.0
Navarretia intertexta	17	0.2	100	1.0	50	1.0	25	0.3	0	0.0	0	0.0	0	0.0
Nemophila breviflora	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3	0	0.0	0	0.0
Nothocalais troximoides	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Orobanche corymbosa	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Orobanche fasciculata	0	0.0	0	0.0	25	0.3	25	0.3	0	0.0	0	0.0	0	0.0
Orthocarpus hispidus	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Orthocarpus luteus	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Penstemon attenuatus	0	0.0	50	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Penstemon deustus	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Penstemon sp.	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Perideridia montana	33	0.3	100	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Phlox longifolia	17	0.2	50	0.5	13	0.1	50	0.8	0	0.0	0	0.0	0	0.0
Phoenicaulis cheiranthoides	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Plagiobothrys leptocladus	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Plagiobothrys scouleri	0	0.0	0	0.0	38	0.4	0	0.0	0	0.0	0	0.0	0	0.0
Polygonum aviculare	17	0.2	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Polygonum kelloggii	0	0.0	0	0.0	25	0.5	25	0.3	0	0.0	0	0.0	0	0.0
Polygonum sp.	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Potentilla gracilis	0	0.0	100	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Psilocarphus brevissimus	33	1.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Psilocarphus oregonus	17	0.2	0	0.0	25	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Rumex paucifolius	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sidalcea oregana	17	0.2	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sisymbrium altissimum	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3	0	0.0	0	0.0
Tragopogon dubius	17	0.2	0	0.0	13	0.1	0	0.0	17	0.2	0	0.0	0	0.0
Trifolium cyathiferum	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Trifolium longipes	0	0.0	50	10.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Trifolium macrocephalum	33	1.8	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Trifolium sp.	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

	ARCA13/DRYGRAM		ARCA13/FEID		ARCA13/MURI		ARPA16		ARTRT/ELCI2		SAVE4/DISP		SAVE4/POSE	
Urtica dioica	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Veronica biloba	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Veronica peregrina	17	0.2	0	0.0	25	0.3	25	0.3	0	0.0	0	0.0	0	0.0
Wyethia sp.	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Xanthium strumarium	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
GRAMINOIDS														
Agropyron smithii	17	0.5	50	4.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Agropyron spicatum	17	5.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Alopecurus sp.	0	0.0	0	0.0	38	2.8	0	0.0	0	0.0	0	0.0	0	0.0
Apera interrupta	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3	0	0.0	0	0.0
Apera sp.	17	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Bromus tectorum	17	0.2	0	0.0	0	0.0	0	0.0	83	18.3	0	0.0	100	1.0
Carex douglasii	17	1.7	50	20.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Danthonia californica	17	0.2	100	1.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Deschampsia danthonioides	17	0.2	0	0.0	25	1.6	0	0.0	0	0.0	0	0.0	0	0.0
Distichlis spicata	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	90.0	0	0.0
Eleocharis bella	0	0.0	0	0.0	13	3.8	0	0.0	0	0.0	0	0.0	0	0.0
Eleocharis palustris	0	0.0	0	0.0	75	22.9	0	0.0	0	0.0	0	0.0	0	0.0
Eleocharis sp. (annual)	0	0.0	0	0.0	13	2.5	0	0.0	0	0.0	0	0.0	0	0.0
Elymus cinereus	17	0.2	0	0.0	0	0.0	0	0.0	83	51.7	0	0.0	0	0.0
Elymus triticoides var. triticoides	0	0.0	0	0.0	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Festuca idahoensis	33	1.8	100	45.0	0	0.0	50	1.0	17	0.2	0	0.0	0	0.0
Hordeum brachyantherum	0	0.0	100	1.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Hordeum jubatum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
Juncus balticus	0	0.0	100	6.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Juncus bufonius	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Juncus confusus	17	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Juncus orthophyllus	0	0.0	0	0.0	13	2.5	0	0.0	0	0.0	0	0.0	0	0.0
Juncus tenuis	17	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Koeleria nitida	17	0.5	50	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Muhlenbergia richardsonis	17	0.2	100	2.5	88	6.4	0	0.0	0	0.0	0	0.0	0	0.0
Poa nevadensis	100	16.7	50	1.0	50	1.0	25	2.5	33	1.0	0	0.0	0	0.0
Poa pratensis	0	0.0	50	2.5	0	0.0	0	0.0	17	0.2	0	0.0	0	0.0
Poa secunda	0	0.0	0	0.0	0	0.0	100	22.0	50	0.8	0	0.0	100	20.0
Poa sp.	0	0.0	0	0.0	13	0.1	0	0.0	0	0.0	0	0.0	0	0.0
Sitanion hystrix var hordeoides	67	4.5	50	0.5	25	2.5	100	4.3	0	0.0	0	0.0	0	0.0

CAREX SPP., DANTHONIA CALIFORNICA, AND ELEOCHARIS SPP. ALLIANCES

# PLOTS	CANE2 n=3		CASH n=1		CASI2 n=1		DACA3 n=4		ELPA3 (LOTIC) n=2		ELPA3 (LENTIC) n=7		ELRO2 n=4	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
SHRUBS														
Artemisia arbuscula	0	0.0	0	0.0	0	0.0	50	1.0	0	0.0	0	0.0	0	0.0
Artemisia cana	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Rosa woodsii	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Salix exigua	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
FORBS														
Agoseris heterophylla	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Alisma plantago-aquatica	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	14	0.1	0	0.0
Allium acuminatum	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Allium lemmonii	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Angelica kingii	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Antennaria luzuloides	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Arenaria congesta	0	0.0	0	0.0	0	0.0	75	1.3	0	0.0	0	0.0	0	0.0
Artemisia ludoviciana	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Aster ascendens	33	0.3	100	1.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Aster hesperius	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Aster sp.	0	0.0	0	0.0	0	0.0	25	1.3	0	0.0	0	0.0	25	0.3
Berula erecta	67	1.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	75	1.3
Camassia quamash	0	0.0	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0
Camissonia tanacetifolia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.1	0	0.0
Castilleja exilis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Castilleja pallescens	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Centaurium exaltatum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Ceratophyllum demersum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	2.5
Cicuta maculata	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Cirsium arvense	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Collinsia parviflora	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Dodecatheon jeffreyi	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Downingia bicornuta	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.1	0	0.0
Epilobium brachycarpum	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Epilobium ciliatum	100	1.7	100	1.0	100	1.0	25	0.3	0	0.0	0	0.0	25	0.3
Epilobium pygmaeum	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	14	0.4	0	0.0
Erigeron chrysopsidis	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Erigeron sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Eriogonum caespitosum	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Forbs sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Galium bifolium	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Haplopappus uniflorus var. howellii	0	0.0	0	0.0	0	0.0	50	3.3	0	0.0	0	0.0	0	0.0
Helianthus nuttallii	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Iris missouriensis	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Iva axillaris	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.4	0	0.0
Lemna minor	0	0.0	0	0.0	100	1.0	0	0.0	50	0.5	14	0.1	25	0.3
Lomatium cous	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Lomatium leptocarpum	0	0.0	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0
Machaerocarpus californicus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	7.1	0	0.0
Mentha arvensis	0	0.0	100	3.0	0	0.0	0	0.0	100	2.0	14	0.1	0	0.0
Microseris nutans	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Mimulus guttatus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Navarretia intertexta	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	14	0.1	0	0.0
Navarretia sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Orthocarpus luteus	0	0.0	0	0.0	0	0.0	25	1.0	0	0.0	0	0.0	0	0.0
Plantago major	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Polygonum amphibium	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Polygonum bistortoides	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0

	CANE2		CASH		CASI2		DACA3		ELPA3 (LOTIC)		ELPA3 (LENTIC)		ELRO2	
Polygonum kelloggii	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Porterella carnosula	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.1	0	0.0
Potamogeton gramineus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.4	0	0.0
Potamogeton natans	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	1.4	0	0.0
Potamogeton pectinatus	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	14	0.1	0	0.0
Potamogeton pusillus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.1	0	0.0
Potentilla gracilis	0	0.0	100	1.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0
Psilocarphus oregonus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.1	0	0.0
Ranunculus cymbalaria	33	1.0	0	0.0	100	1.0	0	0.0	50	0.5	14	0.1	25	0.3
Rorippa nasturtium-aquaticum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	5.0
Rumex crispus	33	0.3	0	0.0	0	0.0	0	0.0	100	1.0	14	0.1	0	0.0
Rumex salicifolius	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	2.1	0	0.0
Senecio pseudareus	0	0.0	0	0.0	0	0.0	25	1.5	0	0.0	0	0.0	0	0.0
Senecio serra	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Sidalcea oregana	0	0.0	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0
Stellaria sp.	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Taraxacum officinale	0	0.0	0	0.0	0	0.0	25	1.3	50	0.5	0	0.0	0	0.0
Teucrium canadense	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Trifolium cyathiferum	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Trifolium macrocephalum	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Triglochin palustre	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Typha latifolia	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Veronica anagallis-aquatica	33	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.8
Viola sp.	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Wyethia amplexicaulis	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Zigadenus venenosus	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
FERNS AND FERN ALLIES														
Marsilea vestita	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	29	0.3	0	0.0
GRAMINOIDS														
Agrostis scabra	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Agrostis stolonifera	67	3.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.5
Alopecurus aequalis	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	14	0.1	0	0.0
Carex atherodes	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Carex athrostachya	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Carex aurea	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Carex douglasii	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Carex lanuginosa	0	0.0	0	0.0	0	0.0	0	0.0	100	20.5	14	0.1	50	0.5
Carex nebrascensis	100	92.0	0	0.0	100	1.0	25	0.3	0	0.0	0	0.0	25	0.3
Carex sheldonii	0	0.0	100	98.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Carex simulata	0	0.0	0	0.0	100	98.0	0	0.0	0	0.0	0	0.0	0	0.0
Danthonia californica	0	0.0	0	0.0	0	0.0	100	37.5	0	0.0	0	0.0	0	0.0
Deschampsia cespitosa	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	5.0
Eleocharis bolanderi	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Eleocharis palustris	33	1.0	0	0.0	0	0.0	0	0.0	100	70.0	100	63.0	0	0.0
Eleocharis rostellata	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	88.5
Festuca idahoensis	0	0.0	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0
Hordeum brachyantherum	67	0.7	100	1.0	0	0.0	0	0.0	50	0.5	0	0.0	25	0.3
Juncus balticus	100	4.7	0	0.0	100	1.0	25	0.3	50	0.5	14	0.1	25	0.3
Juncus ensifolius	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5
Juncus longistylis	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	14	0.1	0	0.0
Juncus tenuis	0	0.0	0	0.0	0	0.0	25	1.3	0	0.0	0	0.0	0	0.0
Muhlenbergia richardsonis	33	10.0	0	0.0	0	0.0	0	0.0	0	0.0	14	0.1	0	0.0
Phleum pratense	0	0.0	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0
Poa nevadensis	0	0.0	0	0.0	0	0.0	50	1.0	0	0.0	0	0.0	0	0.0
Poa pratensis	0	0.0	0	0.0	0	0.0	25	1.3	50	0.5	0	0.0	0	0.0
Poa secunda	0	0.0	0	0.0	0	0.0	50	3.3	0	0.0	0	0.0	0	0.0
Polypogon monspeliensis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	75	0.8

	CANE2		CASH		CASI2		DACA3		ELPA3 (LOTIC)		ELPA3 (LENTIC)		ELRO2	
Puccinellia pauciflora	33	1.0	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Scirpus americanus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Scirpus pungens	33	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Scirpus validus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.3
Sitanion hystrix var hordeoides	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0

GLYCERIA GRANDIS, HORDEUM BRACHYANTHERUM, JUNCUS BALTICUS, PHRAGMITES AUSTRALIS, AND SCIRPUS SPP ALLIANCES

	GLGR		HOBR2		JUBA		PHAU7		SCAM2		SCPA8		SCPU	
# PLOTS	n=1		n=1		n=4		n=2		n=1		n=1		n=3	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
SHRUBS														
Artemisia cana	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Clematis ligusticifolia	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Rosa woodsii	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Salix exigua	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	100	1.0
Salix lasiandra var. caudata	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	67	0.7
Salix lutea	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
FORBS														
Achillea millefolium	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Alisma plantago-aquatica	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Angelica kingii	0	0.0	0	0.0	25	0.3	50	5.0	0	0.0	0	0.0	0	0.0
Arnica sororia	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia biennis	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia ludoviciana	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Aster ascendens	0	0.0	100	1.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Aster eatonii	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Aster hesperius	0	0.0	0	0.0	0	0.0	50	15.0	0	0.0	0	0.0	0	0.0
Aster sp.	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Berula erecta	0	0.0	0	0.0	25	7.5	0	0.0	0	0.0	0	0.0	0	0.0
Castilleja exilis	0	0.0	0	0.0	25	0.3	0	0.0	100	1.0	0	0.0	0	0.0
Cicuta douglasii	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Cicuta maculata	0	0.0	0	0.0	0	0.0	0	0.0	100	3.0	0	0.0	0	0.0
Cirsium vulgare	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Epilobium brachycarpum	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium ciliatum	100	1.0	100	1.0	75	1.3	50	0.5	100	1.0	100	1.0	0	0.0
Euthamia occidentalis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	67	0.7
Galium aparine	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Gnaphalium palustre	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Lactuca pulchella	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Madia gracilis	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Medicago lupulina	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Mentha arvensis	0	0.0	0	0.0	25	0.8	50	0.5	0	0.0	0	0.0	67	0.7
Mimulus guttatus	100	3.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Montia chamissoi	100	3.0	100	1.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Plantago major	0	0.0	0	0.0	75	4.0	0	0.0	0	0.0	0	0.0	67	0.7
Potentilla anserina	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	67	1.3
Potentilla gracilis	0	0.0	0	0.0	50	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Ranunculus cymbalaria	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	67	0.7
Rorippa nasturtium-aquaticum	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Rumex crispus	100	1.0	100	1.0	75	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Senecio hydrophilus	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Senecio serra	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Sium suave	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Taraxacum officinale	0	0.0	0	0.0	50	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Urtica dioica	0	0.0	0	0.0	25	0.3	50	1.5	0	0.0	0	0.0	0	0.0
Veronica anagallis-aquatica	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3
Viola sp.	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Xanthium strumarium	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	67	0.7
FERNS AND FERN ALLIES														
Equisetum arvense	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	33	0.3
Equisetum laevigatum	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	67	0.7
Marsilea vestita	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
GRAMINOIDS														
Agrostis exarata	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0

	GLGR		HOBR2		JUBA		PHAU7		SCAM2		SCPA8		SCPU	
Agrostis stolonifera	0	0.0	0	0.0	75	3.5	0	0.0	100	1.0	100	1.0	0	0.0
Bromus sp.	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Carex athrostachya	100	1.0	100	1.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Carex aurea	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Carex lanuginosa	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	67	10.3
Carex nebrascensis	0	0.0	0	0.0	75	6.0	0	0.0	0	0.0	0	0.0	0	0.0
Carex subfusca	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Deschampsia cespitosa	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Eleocharis palustris	100	1.0	100	3.0	25	0.8	0	0.0	0	0.0	0	0.0	100	13.7
Eleocharis rostellata	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Elymus cinereus	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Glyceria elata	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	100	1.0	0	0.0
Glyceria grandis	100	98.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Hordeum brachyantherum	0	0.0	100	98.0	75	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Juncus balticus	0	0.0	0	0.0	100	62.5	0	0.0	0	0.0	0	0.0	0	0.0
Juncus bufonius	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Juncus ensifolius	100	3.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Juncus longistylis	0	0.0	0	0.0	25	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Juncus orthophyllus	100	10.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Juncus tenuis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0	0	0.0
Muhlenbergia asperifolia	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Muhlenbergia richardsonis	0	0.0	0	0.0	100	11.8	0	0.0	0	0.0	0	0.0	0	0.0
Phalaris arundinaceae	0	0.0	0	0.0	0	0.0	50	0.5	100	1.0	0	0.0	67	0.7
Phragmites australis	0	0.0	0	0.0	0	0.0	100	98.0	0	0.0	0	0.0	0	0.0
Poa nevadensis	0	0.0	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Poa pratensis	0	0.0	100	1.0	75	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Polypogon monspeliensis	0	0.0	0	0.0	25	0.3	0	0.0	100	1.0	0	0.0	0	0.0
Puccinellia sp.	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Scirpus americanus	0	0.0	0	0.0	0	0.0	0	0.0	100	98.0	0	0.0	0	0.0
Scirpus pallidus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	100	98.0	0	0.0
Scirpus pungens	0	0.0	0	0.0	25	0.3	0	0.0	0	0.0	0	0.0	100	76.7
Scirpus validus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	33	0.3

ARTEMISIA LUDOVICIANA, BERULA ERECTA, CAMISSIA CUSICKII, LEPIDIUM DAVISII, AND MIMULUS GUTTATUS ALLIANCES

	ARLU		BEER		CACU		LEDA2		MIGU	
# PLOTS	n=4		n=2		n=1		n=2		n=1	
SPECIES	CON	COVER	CON	COVER	CON	COVER	CON	COVER	CON	COVER
SHRUBS										
Artemisia cana	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Rosa woodsii	25	0.3	50	0.5	0	0.0	0	0.0	0	0.0
Salix lemmonii	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
FORBS										
Achillea millefolium	50	0.5	50	0.5	0	0.0	0	0.0	0	0.0
Angelica kingii	0	0.0	50	5.0	0	0.0	0	0.0	0	0.0
Arnica sororia	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Artemisia ludoviciana	100	25.0	0	0.0	100	20.0	0	0.0	0	0.0
Aster ascendens	50	0.5	50	0.5	0	0.0	0	0.0	0	0.0
Aster eatonii	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Berula erecta	0	0.0	100	89.0	0	0.0	0	0.0	0	0.0
Camassia cusickii	0	0.0	0	0.0	100	80.0	0	0.0	0	0.0
Cardamine pennsylvanica	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Cardaria draba	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Castilleja miniata	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Cymopterus longipes	0	0.0	0	0.0	0	0.0	100	2.0	0	0.0
Epilobium brachycarpum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Epilobium ciliatum	0	0.0	50	0.5	0	0.0	0	0.0	100	80.0
Gayophytum ramosissimum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Gnaphalium palustre	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Haplopappus acaulis	0	0.0	0	0.0	0	0.0	50	0.5	0	0.0
Haplopappus hirtus var. hirtus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Haplopappus uniflorus var. uniflorus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Helianthus annuus	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Hypericum formosum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Iva axillaris	25	0.8	0	0.0	0	0.0	0	0.0	0	0.0
Lactuca serriola	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Lepidium davisii	0	0.0	0	0.0	0	0.0	100	3.0	0	0.0
Madia glomerata	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Mentha arvensis	25	0.3	50	0.5	0	0.0	0	0.0	0	0.0
Mertensia ciliata	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Mimulus guttatus	0	0.0	0	0.0	0	0.0	0	0.0	100	50.0
Navarretia intertexta	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Orobanche fasciculata	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Perideridia montana	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Phacelia heterophylla	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Plantago major	0	0.0	50	1.5	0	0.0	0	0.0	0	0.0
Potentilla gracilis	25	0.3	50	0.5	100	1.0	0	0.0	0	0.0
Ranunculus testiculatus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Rumex crispus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Taraxacum officinale	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Trifolium longipes	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Triodanis perfoliata	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Veronica americana	0	0.0	50	0.5	0	0.0	0	0.0	0	0.0
Veronica anagallis-aquatica	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Xanthium strumarium	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
FERNS AND FERN ALLIES										
Marsilea vestita	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
GRAMINOIDS										
Agropyron smithii	50	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Agrostis exarata	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Agrostis stolonifera	25	0.3	100	10.0	0	0.0	0	0.0	0	0.0
Alopecurus aequalis	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0

	ARLU		BEER		CACU		LEDA2		MIGU	
Bromus brizaeformis	0	0.0	0	0.0	100	1.0	0	0.0	0	0.0
Bromus tectorum	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Carex athrostachya	25	0.3	0	0.0	0	0.0	0	0.0	100	1.0
Carex douglasii	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Carex nebrascensis	0	0.0	100	1.0	0	0.0	0	0.0	0	0.0
Danthonia californica	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Deschampsia elongata	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Eleocharis palustris	50	2.8	0	0.0	0	0.0	0	0.0	0	0.0
Elymus glaucus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Hordeum brachyantherum	50	0.5	50	0.5	0	0.0	0	0.0	0	0.0
Juncus balticus	50	1.0	50	5.0	0	0.0	0	0.0	0	0.0
Juncus bufonius	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Juncus ensifolius	0	0.0	50	1.5	0	0.0	0	0.0	0	0.0
Juncus orthophyllus	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Muhlenbergia richardsonis	50	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Poa interior	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Poa nevadensis	0	0.0	50	1.5	0	0.0	0	0.0	0	0.0
Poa palustris	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Poa pratensis	0	0.0	50	1.5	0	0.0	0	0.0	100	1.0
Poa secunda	25	2.5	0	0.0	0	0.0	0	0.0	0	0.0
Polypogon monspeliensis	75	0.8	50	0.5	0	0.0	0	0.0	0	0.0
Puccinellia pauciflora	0	0.0	0	0.0	0	0.0	0	0.0	100	1.0
Sitanion hystrix var hordeoides	25	0.3	0	0.0	0	0.0	0	0.0	0	0.0

APPENDIX D. CDC SITE AND COMMUNITY REPORTING FORMS: Site Survey Form, Community Survey and Ocular Plant Species Data Forms, and Idaho Community Observation Form.

FORM I. SITE SURVEY FORM WHTF 10/30/92

IDENTIFICATION AND LOCATION
SOURCECODE_____ MANUAL _____
SITENAME_____ STATE _____
MO DAY YEAR EXAMINERS
____-____-____ _____
____-____-____ _____
COUNTY:_____ QUADNAME: _____ QUADCODE: _____
_____ _____ _____
_____ _____ _____
____T/____R/_____SECTION(s)
____T/____R/_____SECTION(s)
DIRECTIONS -->_____
_____
_____

ELEMENT OCCURRENCES

Element Name Occ. Plot No. Found? Found? Found? No.

_____
_____
_____
_____
_____
_____
_____

REVISIT NEEDS-->_____
_____
_____

SITE DESCRIPTION/DESIGN

SITE DESCRIPTION--> _____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

TOPOGRAPHIC BASE MAP:
___yes___no 1. element locations and/or boundaries?
___yes___no 2. both primary and secondary boundaries?

BOUNDARY JUSTIFICATION-->_____

_____

_____

_____

PROTECTION URGENCY
U1 immediate threat
U2 threat w/i 5 yrs
U3 threat but not w/i 5 yrs
U4 no threats
U5 land protected
PU COMMENTS:

_____
_____
_____
_____
_____

MANAGEMENT URGENCY
M1 needed this year
M2 needed w/i 5 yrs (or loss)
M3 needed w/i 5 yrs (or degrade)
M4 may be needed in future
M5 none needed
MU COMMENTS:

_____
_____
_____
_____
_____

STEWARDSHIP

LAND USE COMMENTS --> _____

_____

_____

_____

POTENTIAL HAZARDS --> _____

_____

_____

EXOTIC FLORA/FAUNA COMMENTS--> _____

_____

_____

OFF-SITE CONSIDERATIONS--> _____

_____

_____

SITE AND ELEMENT MANAGEMENT NEEDS --> _____

_____

_____

SKETCH MAP (e.g., show: (1) EO locations, (2) study plots, (3) natural landmarks, (4) disturbance features, such as structures, trails, logging areas, etc... Include cross section if possible. Include scale and indicate north.)

FORM II. COMMUNITY SURVEY FORM
WHTF 10/30/92

IDENTIFICATION AND LOCATION
SOURCECODE_____ MANUAL_____ UNITS __ft __m
PLOT NO._____ MO____ DAY___ YEAR____ EOCODE_____*___
EXAMINER(s) _____
PNC_____ CT _____
SITE_____ STATE_____ COUNTY_____
PURP___ PREC___ QUADNAME_____ QUADCODE_____
____T/____R/___S/___4S/___4/4 COMMUNITY SIZE (acres)_____
PLOT TYPES_____ PLTRL_____ PLOT W_____ SURVEY_____
PHOTOS_____Specim_____SpecClas_____
DIRECTIONS -->_____
_____
_____
_____

CONSERVATION RANKING

QUAL ___ Com: _____
COND ___ Com: _____
VIAB ___ Com: _____
DEFN ___ Com: _____
RANK ___ Com: _____
THREATS _____
MGMT: _____
OWNERPROT__PROT:_____

ENVIRONMENTAL FEATURES

DL_____ SOIL RPT_____
SOIL UNIT_____ SOIL TAXON_____PM_____
LANDFORM_____ PLOT POS_____ SLP SHAPE_____ ASP_____
SLOPE % _____ELEVATION _____ EROS POTENT_____ EROS TYPE_____
HORIZON ANGLE (%): N____E____S____W____ IFSLP_____ IFVAL_____
SPFE_____
GROUND COVER: ___S+___G+___R+___L+___W+___M+___BV+___O ~ = 100%
GROUND COVER DIST_____ ANIMAL USE EVIDENCE_____
DISTURBANCE HISTORY (type, intensity, frequency, season)-->
_____
_____
_____
RIPARIAN FEATURES: Channel Width_____Channel Entrench_____
Surface Water_____Channel Depth_____Dist from H20_____
Valley Floor Gradient_____Floodplain Width___Bed Material_____

GENERAL SITE DESCRIPTION (landscape condition and adjacent ct's)
_____
_____

FORM III. OCULAR PLANT SPECIES DATA
10/30/92PltIDL____

PLOT NO. _____ NO. SPECIES ____ PNC _____

TREES Tot Cv___ MHt___
Tal Cv___ Med Cv___
Low Cv___ Grd Cv___ CC

T 1_____/_____ ____
T 2_____/_____ ____
T 3_____/_____ ____
T 4_____/_____ ____
T 5_____/_____ ____

SHRBS Tot Cv___ MHt___
Tal Cv___ Med Cv___
Low Cv___ Grd Cv___ CC

S 1_____/_____ ____
S 2_____/_____ ____
S 3_____/_____ ____
S 4_____/_____ ____
S 5_____/_____ ____
S 6_____/_____ ____
S 7_____/_____ ____
S 8_____/_____ ____
S 9_____/_____ ____
S10_____/_____ ____
S11_____/_____ ____
S12_____/_____ ____

GRAM Tot Cv___ MHt___
Med Cv___ Low Cv___
Grd Cv___ CC

G 1_____/_____ ____
G 2_____/_____ ____
G 3_____/_____ ____
G 4_____/_____ ____
G 5_____/_____ ____
G 6_____/_____ ____
G 7_____/_____ ____
G 8_____/_____ ____
G 9_____/_____ ____
G10_____/_____ ____
G11_____/_____ ____
G12_____/_____ ____

FRBS Tot Cv___ MHt___
Med Cv___ Low Cv___
Grd Cv___ CC

F 1_____/_____ ____
F 2_____/_____ ____
F 3_____/_____ ____
F 4_____/_____ ____
F 5_____/_____ ____
F 6_____/_____ ____
F 7_____/_____ ____
F 8_____/_____ ____
F 9_____/_____ ____
F10_____/_____ ____
F11_____/_____ ____
F12_____/_____ ____
F13_____/_____ ____
F14_____/_____ ____
F15_____/_____ ____
_____/_____ ____
_____/_____ ____

Idaho Community Observation Form

Mail to:
Idaho Conservation Data Center
Idaho Dept. of Fish and Game
600 S. Walnut
P.O. Box 25
Boise, ID 83702
(208) 334-3402

For office use only
Source Code _____ Quad Code _____

Community Code_____ Occ # _____

Map Index # _____ Update Y _____ N _____

Please provide as much of the following information as you can. Please attach a map (USGS 7.5 minute series preferred) showing the site's location and boundaries. If observation is based on a a detailed survey please attach a copy of plot data. A releve' form is available on the back of this sheet.

Community name: _____ Source: _____
Reporter: _____ Phone _____
Affiliation and Address _____
Date of field work: _____County: _____
Location:_ _____
_____
_____

Quad name: _____ T____R____ ____¼ of____ ¼ sec____
_____ T____R____ ____¼ of____ ¼ sec____
_____ T____R____ ____¼ of____ ¼ sec____
_____ T____R____ ____¼ of____ ¼ sec____

Landowner/Manager: _____ Photographs: Slide _ Print _
Elevation: _____to_____ Aspect: _____ Slope (indicate % or °) _____ Stand area: _____
Evidence of disturbance/threats: _____
_____
_____
Current land use: _____
_____
_____
_____
Substrate/Soils: _____
_____
_____
_____
General description of community: _____
_____
_____
_____
Any Special Plants or Animals present: _____
_____
_____
Successional status/Seral and structural condition: _____
_____
_____
_____
Overall site quality: Excellent _____ Good _____ Fair _____ Poor _____ Comments: _____
_____
Basis for report: Remote image _____ Binocular/Telescopic survey_____
Windshield survey _____ Brief walk-thru _____ Detailed survey _____ Other_____
Continue by completing releve' information on the back or attaching plot survey form.

Relevé: In the space below, indicate each species cover % within the growth form categories:
Is this a complete species list____ ? or partial species list_____?

Trees	Shrubs	Herbs/Graminoids

THANK YOU FOR YOUR COOPERATION!

APPENDIX E. PHOTO CREDITS

Association	Site	Date	Photographer
Alnus rhombifolia/Philadelphus lewisii	Hixon HMP Area (plot 97RM031)	8/6/97	R. K. Moseley
Populus tremuloides/Cornus sericea	Dead Dog Creek (plot 98RM033)	7/29/98	R. K. Moseley
Populus trichocarpa/Rosa woodsii	Rocking M Ranch, Dennett Creek (plot DENN03B)	6/25/98	R. K. Moseley
Populus trichocarpa/Salix lasiandra	Syrup Creek Exclosure (plot 98RM059)	8/13/98	R. K. Moseley
Populus trichocarpa/Salix lutea	East Fork Jarbidge River (plot 98RM068)	8/18/98	R. K. Moseley
Populus trichocarpa/Symphoricarpos albus	Goodrich Creek	7/2/97	R. K. Moseley
Populus trichocarpa/Acer glabrum	Rocking M Ranch, Dennett Creek (plot DENN02B)	6/25/98	R. K. Moseley
Juniperus occidentalis ephemeral drainage (T)	45 Ranch, Juniper Basin (plot 98RM077)	8/25/98	R. K. Moseley
Juniperus scopulorum/Elymus glaucus	East Fork Jarbidge River (plot 98CM006)	8/18/98	R. K. Moseley
Juniperus scopulorum/Equisetum (arvense, hyemale) (T)	East Fork Jarbidge River (plot 98CM005)	8/18/98	R. K. Moseley
Pseudotsuga menziesii/Cornus sericea	Dead Dog Creek (plot 98RM029)	7/29/98	R. K. Moseley
Betula occidentalis/Cornus sericea	Dead Dog Creek (plot 98RM032)	7/29/98	R. K. Moseley
Betula occidentalis/Mesic forb	Jump Creek (plot 97RM011)	7/15/97	R. K. Moseley
Betula occidentalis/Philadelphus lewisii	Jump Creek (plot 97RM012)	7/15/97	R. K. Moseley
Betula occidentalis/Poa pratensis c.t.	Stewart Gulch (plot 97RM004)	7/3/97	R. K. Moseley
Cornus sericea	Cottonwood Creek	7/14/97	R. K. Moseley
Philadelphus lewisii	Jump Creek (plot 97RM013)	7/15/97	R. K. Moseley
Prunus virginiana d.t.	Cottonwood Creek (plot 97RM010)	7/14/97	R. K. Moseley
Prunus virginiana/Elymus glaucus	Flat Creek (plot 98RM071)	8/19/98	R. K. Moseley
Salix exigua/Barren	45 Ranch, South Fork Owyhee River (plot 98CM002)	7/14/98	R. K. Moseley
Salix exigua/Mesic graminoid	45 Ranch, South Fork Owyhee River	7/14/98	R. K. Moseley
Salix exigua/Rosa woodsii (T)	The Tules	7/24/97	R. K. Moseley
Salix geyeriana/Carex utriculata	Mud Flat Spring Exclosure (plot 98RM038)	7/30/98	R. K. Moseley
Salix geyeriana-Mesic gramionoid()	Three Creek	7/20/00	C. J. Murphy
Salix lasiandra/Bench	Syrup Creek Exclosure (plot98RM005a)	6/15/98	R. K. Moseley

Salix lasiandra/Cornus sericea	Dead Dog Creek (plot 98RM030)	7/29/98	R. K. Moseley
Salix lasiolepis d.t.	Jump Creek (plot 97RM014)	7/15/97	R. K. Moseley
Salix lasiolepis/Barren	Dead Dog Creek (plot 98RM031)	7/29/98	R. K. Moseley
Salix lutea/Rosa woodsii	Flat Creek (plot 98CM007)	8/19/98	R. K. Moseley
Artemisia cana/Dry graminoid	45 Ranch, north of Spring Butte (plot 98RM049)	8/5/98	R. K. Moseley
Artemisia cana/Muhlenbergia richardsonis	45 Ranch (plot 98RM007)	6/29/98	R. K. Moseley
Artemisia papposa	45 Ranch, Long Pull Draw (plot 98RM079)	8/25/98	R. K. Moseley
Artemisia tridentata ssp. *tridentata/Elymus cinereus*	45 Ranch, South Fork Owyhee River	7/14/98	R. K. Moseley
Sarcobatus vermiculatus/Distichilis spicata	TNC Tract – Snake River Birds of Prey (plot 97RM020)	7/22/97	R. K. Moseley
Sarcobatus vermiculatus/Elymus cinereus	Snake River Birds of Prey National Conservation Area	6/1/00	C. J. Murphy
Agropyron smithii	Fort Boise Wildlife Management Area, Boise River	10/1/99	C. J. Murphy
Carex nebrascensis	45 Ranch, Spring Creek (plot 98RM056)	8/6/98	R. K. Moseley
Carex praegracilis	Minidoka National Wildlife Refuge	9/15/99	C. J. Murphy
Carex sheldonii (T)	The Tules (plot 97RM028)	7/24/97	R. K. Moseley
Carex simulata	Kerr Exclosure (plot 98RM037)	7/30/98	R. K. Moseley
Danthonia californica	45 Ranch, Spring Butte (plot 98RM008)	7/1/98	R. K. Moseley
Distichlis spicata	Fort Boise Wildlife Management Area, Boise River	10/1/99	C. J. Murphy
Eleocharis palustris lotic	45 Ranch, Little Owyhee River	7/23/98	M. Mancuso
Eleocharis palustris vernal pool	45 Ranch, Oregon Lake	8/5/98	M. Mancuso
Eleocharis rostellata	45 Ranch, South Fork Owyhee River (plot 98RM024)	7/21/98	R. K. Moseley
Glyceria grandis	Charity Spring Exclosure (plot 98RM039)	7/30/98	R. K. Moseley
Hordeum brachyantherum	Charity Spring Exclosure (plot 98RM042)	7/30/98	R. K. Moseley
Juncus balticus	Kerr Exclosure (plot 98RM035)	7/30/98	R. K. Moseley
Phragmites australis	45 Ranch, Coyote Hole, South Fork Owyhee River	8/27/98	R. K. Moseley
Scirpus americanus	45 Ranch, South Fork Owyhee River (plot 98RM023)	7/21/98	R. K. Moseley
Scirpus pungens	45 Ranch, South Fork Owyhee River	7/14/98	R. K. Moseley
Sporobous airoides	Camas National Wildlife Refuge	9/4/98	R. K. Moseley

Artemisia ludoviciana	Current Creek (plot 99RM012)	8/10/99	R. K. Moseley
Berula erecta (T)	45 Ranch, Spring Creek (plot 98RM055)	8/3/98	R. K. Moseley
Camassia cusickii	Summer Creek	6/14/97	R. K. Moseley
Lepidium davisii vernal pool	45 Ranch (plot 97RM024)	7/23/97	R. K. Moseley
Typha (latifolia, angustifolia)	Montour Wildlife/Recreation Area, Payette River	10/19/99	C. J. Murphy